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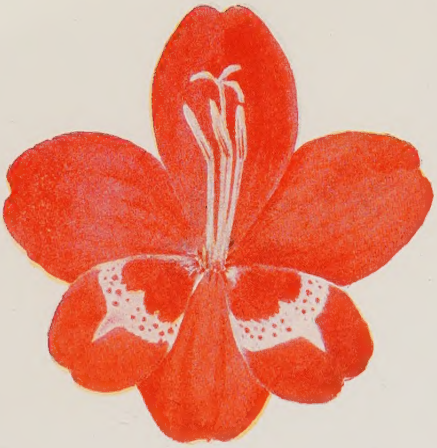
THE GLADIOLUS BOOK



The Blood-red Gladiolus (G. cruentus), with its broad, rounded petals and conspicuous throat markings, is the parent of the Amaryllis-flowered sorts, of which the giant Princeps was the first

Henry C. Goehl is a fine example of the Amaryllis-flowered type

The Maid-of-the-Mist (G. primulinus) has the purest yellow colour of any of the wild species. This colouring, blended with the other colours of gladiolus, and its drooping, hooded upper petal have been transmitted to most of its offspring

Ethelyn is a Primulinus hybrid derived from the Maid-of-the-Mist

THE GLADIOLUS BOOK

BY

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AND

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GARDEN CITY NEW YORK

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FIRST EDITION

PREFACE

It is for the lovers of flowers, the real amateurs, that this book is prepared. Among the thousands of people who admire Gladiolus and grow them in their gardens there are probably many who would like to know more about them: their beginnings, present-day traits, and their possibilities for the future. Gladiolus are so widely grown throughout the world, and in so many climates, that it would be difficult for anyone to know all about them. So we have done what seemed to us to be the best, and the three of us, each conversant with a different phase of the subject, have assembled our knowledge and unified it.

One a traveller and investigator, with scientific knowledge and observations gathered from distant lands; another with the knowledge and point of view of the business man and enthusiast to give it a human touch; the artistic and creative side of the subject is the work of an artist and plant breeder. We have thus attempted to assemble as broad a knowledge of the subject as possible in a group

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small enough to be effective and to make possible a unified whole.

We have likewise drawn freely on the knowledge of others, both from their published writings and by correspondence. Sincere thanks are due to the many Gladiolus enthusiasts who have liberally furnished us information and aided us in this work. Many valuable data have also been gathered from the bulletins of the American and Canadian Gladiolus societies and of Cornell University; from articles in *Horticulture*, the *Flower Grower*, and *South African Gardening and Country Life;* from Miss McCullock's and Doctor Massey's bulletins on Gladiolus diseases and from many other sources. In our discussion of the work of individual growers and breeders many of the details were furnished to us directly by them especially for this work, and in all cases we have added to this outside material facts from our own observation and experience. For any merits this book may have we give full credit to our friends and their help.

We of course realize that this book of ours is not complete. New facts are continually coming to light, new discoveries being made, and new significance is being found in old things. No book on the Gladiolus can ever be complete unless the flower ceases to advance and improve, or becomes extinct; and we sincerely trust that these things will

never happen. It is our hope that the narrative here presented, of one full year of the Gladiolus, may prove interesting and helpful to others, as it has helped us to clear up our own ideas during the course of its preparation. It starts with the history, as a background for the present, then considers the selection of the sorts to plant, going through the culture and handling of them from season to season, both outdoors in summer and under glass or at the Southern home in winter, and finishes with the judging of the flowers, and comment about the organizations that promote the welfare of the Gladiolus.

To avoid confusing the minds of our readers, we have kept in the main to established facts of proven value, and have avoided discussion of things of doubtful or disputed value, however attractive they may be made to appear. Thus we have not featured in our discussions the very latest novelties among the varieties. There are undoubtedly many fine ones among them, and we are given to understand that they are all remarkable improvements, if we are to credit fully all that the introducers say of them. But we make allowance for the enthusiasm of the originator, which is akin to that of a mother for her children. Remember that because of their very newness they have not had thorough trial in enough different localities to

prove their general worth and adaptability. So we have been conservative, and have recommended only sorts of which we have confirmative reports from experienced growers besides the introducer. The detailed treatment of the numbers of new introductions is left in the hands of the Gladiolus Trial Grounds, and of specialists in the study and rating of varieties such as Chas. E. F. Gersdorff.

Some of our chapters have already been published in the *Garden & Home Builder*, and we wish most sincerely to thank the Editor for those parts which have already appeared in that magazine.

Forman T. McLean.
Wm. Edwin Clark.
Eugene N. Fischer.

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THE GLADIOLUS BOOK

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CHAPTER I

HISTORY

THE popular and colourful group of large-flowered garden Gladiolus is a distinctly modern development. But to trace its history properly we must dip into the records of the dim past. Some of the members of this diverse group of the "Sward Lilies" have their homes at the very cradle of our civilization, in Mesopotamia, and they extend into the Mediterranean region and into southern Europe. The main centre of distribution of these, as of so many of our finest cultivated bulbs, is South Africa.

The Gladiolus was known to the people of the Holy Land, of Greece, and of Rome. It may have been the "lily of the field" referred to in the Biblical parable, for the Asiatic Gladiolus have that rich royal purple tint so prized by the ancients. Though this is claimed by some Gladiolus enthusiasts, it is uncertain. But the Greek references to the flower are unmistakable. The ancient Greek physician, Dioscorides, tells us that a purple-

flowered Gladiolus grew in the grain fields of Greece as it still does to-day. From its preference for cultivated ground, this and the other European species have earned for themselves the name of Corn Flags. The Romans also early recognized the beauty and grace of these lilylike flowers, and according to Atheneus they were planted on the graves of the virgins.

The European and Asiatic wild Gladiolus, of which there are about fifteen kinds, found little favour among gardeners, because of their small size and lack of variety in colouring. A few of them are still occasionally grown, such as G. communis, the Common Corn Flag; G. segetum, the Italian Corn Flag; and G. byzantinus, the Turkish Corn Flag. All of these have reddish purple flowers, with a white stripe through the centre of each lower petal. White, flesh-coloured, and pink varieties of these and of allied species were perpetuated in cultivation, but little improvement was made in either the size or the form of the flowers, which remained small and narrow-petalled. The best of them is the Turkish Corn Flag.

The exploration of the Cape of Good Hope during the Seventeenth and Eighteenth centuries uncovered a wealth of gorgeous wild flowers—Freesias, Pelargoniums, Ixias, Watsonias, Heaths, and a host of others. Among the most varied and beau-

America, a good general-purpose variety, with both substance and lasting quality

tiful of the wild things of this lovely wilderness were the many forms of the Gladiolus.

Mrs. L. Bolus, writing in the *South African Gardening and Country Life*, says of them:

There are about 150 species of Gladiolus known, of which 15 are natives of Europe and western Asia. All the rest belong to Africa, and especially South Africa, where there are few localities, indeed, without one or more species of this lovely genus to beautify them. In the coastal districts, from Namaqualand to Natal, they grow on mountains, hills, and plains. More rarely you will find them in swampy places (Yellow Marsh Afrikander), or among moss and fern within reach of a waterfall's spray (Waterfall Gladiolus); or even on rocky cliffs against which the sea-waves beat (Cliff Gladiolus, or Klip Lily). Inland, too, they penetrate, even to the heart of the Karroo, where one species with edible corms (G. edulis) is widely spread. In some parts there is always one species, if not more, in flower during every month of the year.

What a goodly heritage it is that has come down to us from the long-past ages! Think of the different kinds you know, and try to realize how great a variety there is in this genus. Some are robust plants, standing three feet high, with broad, strongly ribbed leaves; others are so delicate-looking and slender that you marvel how they can live through the rough winter weather they have to face in the Western Province; and between these two extremes there is every possible gradation you can imagine.

Most of the Gladioli are without scent; and those that are fragrant are usually sweetest toward evening, and on that account have been called "Avondblom."

Although the symmetry of the Gladiolus flower is always "yoked" (zygomorphic) and the stamens arch under the upper petal, yet the shape varies considerably. For example, the Painted Ladies and Brown Afrikanders usually have long, tapering segments which are gracefully recurved and a

long tube; and the "Kalkoentjes" have loose, wide-open flowers; but in the Tulbagh Bell, the Riverdale Blue Bell, and the Caledon Blue Bell, we find the tube short and the perianth segments keeping close together and forming the bell-shaped flower we all admire so much.

Botanists thus estimate the number of species at 150, but their classification need not concern us overmuch, except as a means of designating some of the more interesting forms. The botany of this section of the Iris family is very confused, and probably more so with the Gladiolus than with other forms, for the Gladiolus is apparently the meeting ground of several related genera. Thus there are Gladiolus closely resembling Babianas, others approaching the Acidantheras, and some are so close to the Antholyzas that they are sometimes classed as the one, sometimes as the other. Others are close enough to the Watsonias that they have been crossed with them. We need not puzzle our heads with what is a Gladiolus, since the experts themselves disagree. Even well within the boundaries of the group, the forms of the Gladiolus are so variable that species are hard to define. Gladiolus recurvus, the Blue Afrikander, has bronze, purple, and lavender forms while a blue and a yellow form of the Purple-blotched Gladiolus, G. papilio and pupureo-auratus, are classed as two different species. With such confusion, it seems

best to consider as different whatever kinds have distinct horticultural values. From this point of view, the yellow G. purpureo-auratus, or Purple-spotted Gladiolus, and the bluish purple-coloured G. papilio, or Butterfly Gladiolus, are different, as each has contributed distinct colours to the garden forms. Whatever the botanist may say of them, they are surely distinct to the gardener.

The South African Gladiolus are the parents of all of our modern garden forms, for the European sorts were found not to intercross readily with the South African ones, and they are so inferior to the South African species that they have been largely discarded.

South Africa is thus the birthplace of the primitive forms from which our garden Gladiolus sprang, and they have brought with them many of the traits and peculiarities resulting from the conditions to which they were accustomed in their native homes. These traits have been handed on to even their remote descendants to a surprising degree. So a glimpse at the general character of that semi-arid wilderness of diamonds, gold, and wool, will give us a better understanding of our present-day garden flowers.

First of all, South Africa lies almost wholly within the dry sub-tropical belt of the earth, corresponding roughly in its climatic conditions to our

own Southwest and Mexico, to Asia Minor and Australia. It is saved from being a true desert by having seasonal rainfall, but it is in general a sunny and treeless region—a land of scrubby thickets and grassy plains rather than forests. Its climate is varied, truly, and the southernmost coast of Africa has well-distributed and sufficient rainfall; but it is all a sunny land, and we need be little surprised that the Gladiolus, like all of the Cape bulbs, is a sun-loving plant.

For the most part South Africa is mild as well as sunny—a land of oranges, and of sugarcane and bananas in some parts; the cool regions are only in the mountains. There are snowy ranges separating the narrow coastal belt from the great arid plains of the tableland—the Karroo—and in these mountains are some of the aristocrats of the Gladiolus world, with fine and brilliant flowers, such as those of the imposing G. cruentus, the Blood-red Gladiolus, and of G. cardinalis, the Superb Gladiolus; but these forms are apt to be impatient alike of extremes of heat or of cold, of drought or wet.

Most of the ancestors of our garden Gladiolus came from the mild coastal region, and this we may roughly divide into the western coast, centring around the Cape peninsula, and the eastern coast, around Natal. The winter storms from the west

bring to the region around Cape Town a climate much like that of California, with a mild moist winter of luxuriant vegetation and a brilliant spring-flowering season, when all of the plants bloom at once in one gorgeous display of intense colouring. The southeast monsoons of summer leave this leeward coast dry and parched. So the lowland vegetation makes its growth during the mild, cool winters, and the Gladiolus from this region are for the most part quick-growing and early-flowering.

Only the high mountains get some precipitation from condensed fogs in summer. Thus Cape Town's landmark, Table Mountain, like San Francisco's Tamalpais, is often covered in summer with a white tablecloth of fog, and supports luxuriant summer vegetation.

The eastern coast, partially protected from the rough winter storms of the west, gets most of its rainfall in summer showers, which accompany the southeast monsoons, blowing in from the Indian Ocean. These winds also carry far inland, giving the high veldt a scanty and uncertain summer rainfall. Thus the growing season of the eastern coast, in the vicinity of Natal, and of the interior likewise, is the warm, moist summer, the drier winter being the resting period. Because of this similarity of climate, many of the Natal species of Gladiolus

range far inland, and are accordingly more adaptable in their climatic and soil requirements than are most of the Cape sorts.

The extreme south end of Africa, around Port Elizabeth, gets precipitation from both the winter storms and summer monsoons, and has probably as equable a climate as will be found anywhere in Africa.

The first settlement in South Africa was at Cape Town, where the merchant ships bound for the Indies found safe haven from the storms of the blustery Cape. Hence from there came the first importations of South African wild flowers into Europe, and they included a goodly number of fine Gladiolus. Most of these are slender, early-blooming sorts, adapted to grow during the mild, moist winters at the Cape. They flower in early spring and quickly finish their growth before the onset of the summer drought. Their short, curved, wiry stems, each supporting a few dainty blooms, bend easily away from the strong winds, and thus protect both flowers and stalks from damage more effectively than would a stouter stem. Many of these, such as Gladiolus blandus, the Fairest Gladiolus; G. angustus, the Narrow-leaved Gladiolus; G. alatus, the wide-open, winged Kalkoentje, have bright-coloured flowers of most varied forms, some of them having ruffled petals, like G. cuspida-

tus, the Tall Gladiolus. Several have bright spots on the lower petals, and these are called Painted Ladies by the small boys of South Africa. A few of them are fragrant; G. recurvus, the Blue Afrikander; G. tristis, the Yellow Swamp Afrikander or Avondblom of the Boers; G. grandis, the Large Brown Afrikander; G. hirsutus, the Pink Afrikander, and some others are pleasantly scented especially toward evening. Indeed, while modern Gladiolus growers are unfamiliar with the fragrant forms, the first of the Gladiolus introduced into Europe were fragrant ones, and were probably prized as much for their fragrance as their beauty! One of the finest of the early introductions is G. cardinalis, the Superb Gladiolus, a tall, late, free-flowering species. Coming from the moist mountainsides back of Table Mountain, where it is frequently drenched by the fogs during the summer, it is larger and more vigorous than the lowland sorts. Both it and its hybrids, the Colvillei strain, are still prized by European growers.

All of the Cape forms throve in the mild climate of England and southern Europe and were easily hybridized, giving rise to a group of fall-planted, early-flowering varieties, useful for bedding and forcing early cut flowers. They are not hardy in the northeastern United States, though popular in California, under the name of Baby Gladiolus.

Most of the cultivated varieties of this dwarf type have wide-open, star-shaped flowers, with oval, dark-bordered, white, or pale-coloured blotches on the three lower petals. In colour they range from white to pink, red, and purple and are borne on slender, often curved spikes.

From the early settlements at Cape Town, botanical exploration extended around the Cape to the eastern coast of South Africa, into the region around Natal. With the new conditions quite different plants were found and brought to Europe. This region, with its southeast summer monsoons, has a warm, moist summer and comparatively dry winter, thus permitting of rank summer growth of vegetation. The long, warm growing season is conducive to slow growth, late flowering, and large size of plants. Consequently, many of the Gladiolus from there are tall, vigorous growers. Their many-flowered stems are stout and erect, to lift them above the rank undergrowth. When these forms were crossed with one another and with the earlier-flowering sorts, they gave rise to a new race of large, late, summer-flowering varieties.

The first of these late-blooming sorts was the offspring of a cross between two Natal species: the red-and-yellow flowered G. psittacinus, or Parrot Gladiolus, and the white or pale pink, tall G. oppositiflorus, or Opposite-flowered Gladiolus. This hy-

brid surpassed both its parents as a garden flower, having many well-opened bright red flowers on a tall spike. It was named, from its place of origin, Gladiolus gandavensis, or the Ghent Gladiolus, and was the forerunner of a race that was of prime importance for nearly half a century, from 1842 to 1890. All of the best large-flowered modern Gladiolus have been developed from this parent stock.

The Natal species, which are dormant during the cool, dry winters, also extend inland to the plains, where they enjoy a less assured moisture supply than do the native plants of the Cape. They accordingly have harder, more drought-resistant bulbs than the latter, and particularly hard-shelled bulblets.[1] This characteristic of hard-shelled, slow-sprouting bulblets is frequently found among their modern descendants, and in them is more of an embarrassment than a benefit.

The yellow-centred red varieties still abundant in old gardens get their colouring from the Parrot Gladiolus. The other parent of the Ghent Gladiolus, the Opposite-flowered Gladiolus, is a tall grower, often four or five feet high, with long spikes of as many as forty flowers. The pink-tinted white flowers are in two crowded rows facing in opposite directions—an arrangement peculiar to this and

[1]The terms *bulb* and *bulblet* are here used because they are the most familiar ones. Botanists call the Gladiolus bulb a *corm*, it being really a thickened stem or *cormus*. According to scientific terminology the bulblets are more properly called *cormels*.

two or three closely related species. Tendencies toward this occasionally crop out to mar the symmetry of arrangement of the flowers in modern seedlings. The white-flowered varieties get their colouring largely from this species, and both the tendency toward dark lines in the throat and toward erect, pointed petalled flowers may be traced to it.

Another species which contributed conspicuously to the advancement of the Gladiolus was G. purpureo-auratus, the Purple-spotted Gladiolus, likewise from Natal. That able French plant breeder, Victor Lemoine, found this species to be hardy at his home at Nancy, France, and he crossed it with the best of the Ghent sorts, producing hardy seedlings. These had bell-shaped flowers with yellow-bordered maroon blotches on the lower petals, and widely spaced on long slender stalks, as in the Purple-spotted Gladiolus; but the colours were varied, and in many the blotches on the lower petals were a bright reddish purple with a yellow border. Early in the development of this strain, Lemoine intercrossed it with the closely related G. papilio, the Butterfly Gladiolus, another Natal sort with similar markings, but with a ground colour of pale purple instead of yellow. From this cross he obtained sorts ranging in colour from lavender and purple to almost blue. The Lemoinei type of

Gladiolus was introduced in 1880, and is still prized in Europe for its hardiness and rich colours. Nearly all of the dark blotched modern Gladiolus and the blue and purple sorts are descendants from this strain.

At about this same time, a newly introduced species from the mountains of South Africa, Gladiolus saundersii, was used in hybridizing with the existing sorts, both by Max Leichtlin of Baden Baden and by Lemoine. This species has few flowers on the stalk, but they are large and wide open, the lateral petals being strongly recurved at the tips. The colour is bright scarlet, with a great blotch of white spotted with red in the throat. The hybrids accordingly developed huge, wide-open flowers, and many of them had the bright scarlet colour of their parent.

G. saundersii, being a mountain species, has less adaptability than the lowland forms which are the parents of the Ghent strain. It is less drought resistant, and its bulbs are not so lasting in storage. These traits and its late-flowering habit appeared in many of its immediate offspring. They also opened fewer flowers to the spike and were of poorer keeping quality than those of the old Gandavensis. For these reasons and because of the lively interest in the Lemoine strains at that time, Leichtlin's hybrids were not popular in Europe, and before

being widely disseminated, they passed into the hands of the Hallocks of Long Island, who further developed them and sold them to John Lewis Childs, of Floral Park, N. Y. He introduced the first of the named sorts of this strain, which he renamed the Childsi, in 1893, nearly twenty years after Leichtlin had begun developing them. The varieties then offered were of such outstanding merit, because of their large, showy flowers and vigorous growth, that they attained immediate popularity in this country.

Meantime, Lemoine had crossed G. saundersii with some of his Lemoinei hybrids, producing a similar strain of large-flowered Gladiolus with large throat blotches marked with dots and stripes of contrasting colours. These he called the Nanceanus or Nancy strain, named for his home town of Nancy. Both the Nanceanus and the Childsi sorts were so far superior in size of flower to all of the older kinds that they created a sensation on both sides of the Atlantic. They are so similar as to be practically indistinguishable, and they constitute the foundation stock of the modern large-flowered florists' type.

Soon after Childs sent out his first named sorts of the Childsi strain, Dr. Walter Van Fleet used one of them to cross with G. cruentus, the Blood-red Gladiolus, another mountain species from the

Drakensberg Mountains of Natal. This is one of the largest-flowered of the species, having wide-open, rounded flowers of blood-red, with a deeper red throat surrounded by a huge blotch of white dotted with red. In its growth requirements it seems even fussier than G. saundersii and has died out of cultivation practically everywhere. But one of Doctor Van Fleet's seedlings apparently has all of the robustness of the old Gandavensis, combined with the fine size and form of flower derived from the G. cruentus and G. saundersii species. Its colours are practically like those of G. cruentus. This hybrid was named Princeps, and its immense, finely rounded flowers, borne on stout, robust stalks, have appealed to many breeders. Accordingly, it has been extensively used in hybridizing and has done much to improve the modern Gladiolus, being the parent of all of the so-called amaryllis-flowered sorts.

A third mountain species, but of quite different character, has also contributed toward the upbuilding of some of the forms of the modern Gladiolus. G. quartinianus is a very tall-growing sort from the mountains of tropical Africa, and is principally noteworthy for its great size in all its parts except the flowers, which are medium sized, red and yellow, and hooded. The plants are tall with eight large leaves to each stalk, and the bulbs and

even the bulblets are large, the latter often as large as No. 3 bulbs, being an inch or more in diameter. It is very late flowering. The species is widely distributed throughout tropical Africa, is extremely variable, and quite adaptable in cultivation. The best known of the hybrids from this species are those of Kunderd, though Van Fleet also produced some fine ones, which are apparently not in general cultivation. All of them are very late flowering, like their parent.

The most recent important species to be used in crossing is Gladiolus primulinus, the Maid-of-the-Mist, from Victoria Falls of tropical Africa. It is a small but vigorous and productive species with slender stalks and narrow, hooded, drooping, clear primrose-yellow flowers. The hybrids are grossly misnamed "Prims," for they are anything but prim. They have slender, often curved graceful stalks and the dainty little hooded blossoms of the Maid-of-the-Mist. The yellow colour of the wild parent is charmingly blended in the hybrids with the varied colours of the other parents, the result being sorts with many delicate tints of salmon, buff, apricot, orange, and écru, in bewildering variety. The curious winged birdlike flowers are also favourites with many fanciers, though most of them droop so much as to hide their faces and spoil them for display. Some of the hybrids, however,

particularly those two or more generations removed from the wild species, combine many of the desirable traits of the primulinus—delicate colouring, slender grace, productiveness, and vigour—with large, well-spaced flowers on tall spikes. Other and no less important traits of these primulinus hybrids are their earliness, heat tolerance, and the promptness with which both their bulbs and bulblets sprout after planting. All of these are characteristics associated with their tropical parentage. Being accustomed to a region of constant heat and considerable humidity, the Maid-of-the-Mist grows and grows quickly, whenever the heat and soil moisture supply are adequate.

Considering the great number of the wild forms of the Gladiolus, comparatively few of them have contributed conspicuously to the garden strains. Scarcely more than a dozen have entered into the upbuilding of our summer-flowering strains, and perhaps ten more into the early-flowering "Baby Gladiolus" varieties. There are several reasons why growers have not availed themselves more fully of the wealth of raw materials for breeding work represented by the many wild forms. First, few of the species are adaptable in their habits, and most of these have already been used. The species likewise are apt to be strongly dominant in their immediate offspring, and most of their bad traits

have to be carefully and painstakingly bred out of the hybrids, usually by generations of selection, before desirable sorts with the new traits of the species can be secured. So the growers hesitate, both because of the exacting requirements of the wild forms and because of the discouraging results from first crosses with them. There are traits of form, of colouring, of fragrance, and of growth habits which are possessed by the wild forms and which would be desirable in garden varieties. So the possibilities from further crossing with the wild species are still good, and there are still more than a hundred untried wild forms from which to choose.

Golden Frills is one of Kunderd's fancy ruffled Primulinus sorts. Its little yellow flowers with flame blotch have graceful form and are admirably fitted for small table decorations.

CHAPTER II

MODERN VARIETIES AND THEIR PRODUCERS

EARLY spring! And the enterprising seedmen and dealers are anticipating our garden needs in their handsome and alluring offerings. Gladiolus are being called to our attention more insistently each year—in coloured lithographs, by attractive names, enticing new things, even gardens full of mixed ones for nominal sums. No one's wants are overlooked, from the most fastidious fancier to the most modest cottage gardener who may purchase a whole garden full of bright flowers for the price of one bulb of some new introduction.

Supposing that we wish to make a discriminating choice, what is best among the Gladiolus of today?

That question is not easily answered; tell me the best make of automobile, or radio set, and then I may tell you the best Gladiolus. In other words, it is a matter of personal opinion. But there is a group of outstanding sorts, among which we may confidently look for our choicest kinds, and a very good way to get acquainted with them is through

the work and aims of the people who have developed them, the Gladiolus hybridizers.

This flower has proved most amenable in the hands of hybridizers; so much so that often a breeder has set up in his mind an entirely new standard of form or colour, of vigour or substance of flower, or of some other combination of these or still other traits, and by careful interbreeding and selection of promising seedlings, has succeeded in a few years in fully realizing his ambition to create a flower after his own pattern. Thus Kunderd, who is now identified with so much that is best in modern Gladiolus, started many years ago with the aim to produce a ruffled race. He has not only done this, but he has advanced the Gladiolus in many other ways. Just as the name of Kunderd is associated with the Ruffled Gladiolus, so several other breeders have become identified with advancements along special lines, and are known as producers of one or two types of flower in particular. True, in pursuing one objective, one may rear many commendable seedlings, each representing painstaking effort and each quite too good to be lightly discarded, but they may differ widely from the desired ideal. It so happens that many breeders have put out odd assortments of new varieties without any plan. But the main aims of the Gladiolus breeders have strongly in-

fluenced the character of the modern varieties, as we shall see by considering a few of them, both of this and of other lands.

Before we pass judgment on the value of any new or old sort it is a good plan first to ask ourselves the questions: What is the best use of this flower? Does it fit successfully into its particular niche? These questions, asked collectively by many enthusiasts, have led to systems of classification to which we need refer only briefly here, to get an idea of the characteristics of the principal groups.

The early classification was based on old types of definite origin and form rather than on utility. In the evolution of the present-day Large-flowered race, the old forms have been so intercrossed and blended that these old groupings, into the striped Gandavensis, blotched Lemoinei, deeply hooded Primulinus, and little star-shaped Nanus, no longer apply to the new varieties; except in the case of the Nanus, which have retained their identity, and have been little modified by modern hybridizing work. No such elaborate classification has yet been evolved for these new blended forms of Gladiolus as there is for the modern Peony, Dahlia, or Iris. The simplest classification, and the one most used at the present day, is into the Large-flowered or Grandiflorus, and the Primulinus, or slender, hooded varieties. Some like to make a third group

intermediate between these two, called the Primulinus Grandiflorus or Medio Primulinus class, as the English prefer to call them. Perhaps a more rational treatment for our purpose is to retain the two generally recognized groups, each of which fills a quite definite place in flower usefulness, and further subdivide these along convenient lines.

The large-flowered sorts may be grouped into three classes for our purpose. First, there are several thousand varieties of the sturdy decorative Gladiolus of commerce. These include the kinds with four to six flowers open at once, with stiff, strong stems and good lasting qualities, such as we see displayed abundantly all summer at the florist's and at the roadside stands. This is a rather inclusive group, and great advances in it have been made in this country. In fact, we might almost claim it as an American product, for the ideals of the European gardeners ran in the early days to a showier but less useful exhibition type of flower. For show or exhibition purposes, a maximum of display of flowers at one time seems to be called for. Accordingly, the show type comprises a more narrowly defined group than does the commercial type, and includes sorts with extremely large flowers, preferably on long, close-ranked, floriferous spikes, with many huge flowers open at once. To take the judges' eyes, they must make an imposing

display at the hour that they are judged. Endurance, substance, and dependability are of less moment here than is display value. A third group may be made to include what we may term the fancy varieties, sorts which have special merit because of some peculiar feature, such as ruffled, notched, or oddly shaped flowers, and ones of striking and unusual markings.

The Primulinus, because of their graceful, slender habit and pretty, hooded, birdlike blossoms, are especially useful where beauty of form and delicate colouring are preferred to masses of bloom. For present purposes, we may subdivide these into two classes: The large Prims, and the miniature Prims. The large Prims, or Primulinus Grandiflorus, may have larger, more rounded blooms than the type, frequently less hooded also, but retaining the slender grace inherent in the group and the wide spacing of the flowers on the spikes. Without these traits, they would no longer be useful in the same way as are the Primulinus, and would no longer be entitled to be so classed, even though derived from Primulinus strains. The small Primulinus, with slender, distinctly hooded blooms, rather few in number and widely spaced on the stems, may be classed as the true or miniature Primulinus, in which small size is desirable. Their chief value is in their light, airy, slender grace, not in their mass

display; and they are especially useful for such purposes as bridal bouquets, dainty, light decorations for the breakfast or luncheon table, and for low bowls. One of the merits of the Primulinus is their range of soft, delicate shades of colouring, and accordingly they should be judged more severely on colour than any of the other classes.

The Nanus or Baby Gladiolus group is another distinctive type, which need be only briefly mentioned here, as it has entered scarcely at all into the breeding work of modern hybridizers. C. G. Van Tubergen of Holland has been the chief modern exponent of these agreeable little miniature Gladiolus in recent times, and he has produced some interesting novelties in them. They not only have small, slender, artistically irregular, star-shaped blooms, but their arched, swaying stalks and graceful poise of flowers add to their attractiveness for low bowls and similar classes of decoration. A group of spring-planted, early-blooming sorts of this general type, combined with the vigour and hardihood of the Primulinus, would be a distinct acquisition. But this is looking into the future, and for the present, these need not further concern us.

The French, English, Dutch, German, Australian, and New Zealand hybridizers have done much to develop our modern sorts. But none has done

more for these special favourites of ours than have the Americans, both in Canada and the United States. Wonderful new creations in all colours, both brilliant and delicately shaded; lily-shaped, hooded, ruffled, or even fringed; large, medium, and small, are appearing as if by magic. Of the five thousand or more named varieties in this country, no one person has seen them all. Scores of new varieties are being named yearly. If in the following discussion someone's favourites may be omitted it is hoped that the omission will not be judged too harshly.

So few of the foreign varieties have made headway in this country that it is comparatively easy to survey the outstanding ones, and these will be considered first. Some of the greatest advances in the history of cultivated Gladiolus have been made by Lemoine in France. His Lemoinei and Nanceanus varieties, with their bright colours and vivid throat markings, may be grouped in the fancy varieties and have been his principal contributions. The two best known purple varieties, Baron Joseph Hulot and Heliotrope, are old Lemoine introductions. Others of his blotched Lemoinei sorts are Jean Du Tailles, salmon with a deep maroon throat blotch on each lower petal; and Madam Maunet Sully, creamy white with carmine blotch surrounded by a primrose-yellow border. This last is a poor

propagator but a beautiful flower, having the fine rounded petals and wide-open blooms which characterize many of Lemoine's blotched varieties. Eugene Lefebvre, bright pink with creamy throat thickly dotted and spotted with amaranth, is one of his speckled throated Nanceanus sorts. General Langlois is another of the spotted throated sorts, deep rose in colour, and it opens eight large flowers on the spike at once, making a bright showing. These and most of the Lemoine varieties in this country are old sorts, but fully the equals of the newest introductions in size and substance of flower.

Vilmorin is another French hybridizer who has produced some fine spotted and blotched varieties, of which smoky old-rose Desdemone, with a large amaranth blotch bordered ivory white, is the best known. Brunelet, De Laborde, and several others have also been active, but few or none of their sorts have been pushed in America. One of Gravereau's which has gained some popularity here is Obelisque, a delicate creamy white.

One reason why the French sorts have not been more widely disseminated in this country is that they are a bit uncertain in their behaviour with us. Most of them can be grown well along the seacoasts, but many are ill adapted to our warm, dry summers, are poor propagators, and fail under

field conditions of culture. Reports of them from the Middle West are particularly discouraging. With careful protection from drying winds they make handsome flowers for the fancier, but only a few of them, such as Desdemone, Baron Hulot, and some others, are rugged enough for general culture.

We think of Holland as the land of bulbs and flowers, and Hollanders have done much to advance the Gladiolus to its present state. Their passion for neatness and regularity and their keen sense of commercial values show strongly in their productions. Velthuys has produced some strong, vigorous sorts. The vivid scarlet Liebesfeur and purplish red Goliath are both old varieties of high merit. His Flora is likewise one of our best yellows, though the spikes sometimes kink a bit. Heemskerk's flesh-coloured Le Marechal Foch resembles America and is a larger, showier flower, but it is rather soft in texture and the plant has not the rugged constitution of our America. His violet-purple Jacoba van Beiren is a new sort of moderate size and pretty colouring. Van Zanten's salmon Prince of Wales has many admirers, as has also Velthuys' pink Halley. Both are handsome flowers, and the plants both have similar defects. Like many early-flowering varieties, their bulbs are quite susceptible to diseases. The Hollanders

have also produced some notable Prims. Jonkeer's yellow Souvenir, Krelage's Scarletta, and Grullemans' Salmon Queen are all good. Grullemans in particular has gone in for fine Prims.

The outstanding Gladiolus producer in Germany is Wilhelm Pfitzer. He has produced many fine, large, clear-coloured whites, yellows, reds, and particularly blues. Schwaben is one of the standard commercial yellows. Europa, introduced in 1911, is one of the handsomest clear whites. When well grown, in a congenial moist climate with good culture, it is still the measure by which the newer whites are judged. Pfitzer is perhaps best known among fanciers in this country for his lavenders and blues. Fitscher's Badenia is a handsome, wide-open, bluish lavender, hard to grow and a wretched propagator. Pfitzer's Veilchenblau now gives promise of better success, and is of deeper, richer colour. It and the paler coloured Frau von Konijnenberg are both handsome but quite new in this country, and their future here is not yet certain.

There are several handsome new European Gladiolus, but recalling the fussy behaviour of so many of the sorts from the moist climate of western Europe, one hesitates to recommend them. Many of these are well suited to the carefully tended and protected garden of the summer estate along the

seaboard. Their future for general culture in our dry sunny climate is in many cases doubtful.

Notable exceptions to this are some of Kelway's English sorts. His productions are noteworthy for their strength and vigour, and his Golden Measure and white Purity perform well under most varied conditions. Of the products of other English Gladiolus hybridizers, practically none are known in this country, though we might try with profit some of Mair's tall Show varieties and some of Churcher's new Primulinus hybrids.

The varieties from dry and sunny Australia would seem to have greater promise for this country, though we must remember that the centre of production there, on the coast of Victoria, is in the mildest and moistest part of Australia. There is a lure of distant places about the very idea of new Gladiolus from Australia. We think of boomerangs, eucalyptus, and kangaroos, and look for strange and unusual things from the Antipodes. But we must not forget that the foundation stock of Gilbert Errey, the best-known breeder there, came from England and America, from the same sources as our own to-day. The Australian has much of the expansive, sanguine nature of the Californian, and goes in for size. Errey's Gladiolus are many of them fine showy exhibition sorts.

His large, dark crimson Chancellor and creamy white King Pearl are both upstanding sorts. Leolin is an exquisitely delicate soft pink, deeper toward the edges. Brenda is a slender sort, delicate pink with scarlet blotch. Since the quarantine has invested these and other foreign Gladiolus with the charm of the inaccessible, we will probably hear a lot more about them.

In America there has been a lively interest in Gladiolus during the past quarter century. John Lewis Childs was one of the earliest seed and bulb dealers especially to feature the Gladiolus. His original Childsi varieties have most of them disappeared, though Prince of India is regaining popularity with the demand for smoky shades. Wm. Falconer, one of the first of the Childsi introductions, compares favourably with the newest of the light pinks. But the chief interest in the Childsi strain to-day is as the foundation stock of the American Gladiolus.

Banning was another of the early breeders, and two of his are still prominent as commercial sorts to-day: pink Panama and pale yellow Niagara flaked rose-pink have been literally grown by the millions, and are known all over the world, wherever there are Gladiolus. They have not the length of spike nor extreme size of some of the newer sorts, but are still standards of comparison by

which new sorts may be measured and found wanting for florists' and commercial use.

H. H. Groff of Simcoe, Ontario, has done much to advance the Gladiolus. Flesh-pink America, originated by him as No. 119 and introduced by Banning, is perhaps his most notable and enduring achievement, though he has also produced some very fine reds. He has aimed at sturdiness and adaptability in his varieties, and toward substance in his flowers, rather than toward extreme floriferousness, and he attributes the good substance of his varieties to the foundation stock of the Burbank Gandavensis strain, developed to withstand the withering heat of the California valley summer. Blood-red War and Red Emperor (syn. Dominion) are both sturdy and handsome sorts. Majestic (syn. Scarlet Wonder) is still another fine red. His Peace is a vigorous, late-blooming white, introduced in 1899, and still in its prime. La Luna is white with crimson blotch; Afterglow, salmon-fawn; Blue Jay, lobelia blue with a yellow-bordered deep violet blotch, small but of pretty colour; Dawn is a pretty salmon-pink. All of these have fine substance, vigour, and adaptability.

Groff has retired and turned his Gladiolus stocks over to Cowee, of Berlin, New York, and Campbell Brothers of Simcoe, Groff's home town. Some of Groff's varieties were introduced by Cowee in the

United States, and by Groff himself in Canada under different names, which accounts for some of the synonyms already mentioned. Campbell Brothers have recently brought out Groff's Golden Dream, a pleasing clear deep yellow sort of moderate size, which is much admired in Canada.

Among the very earliest workers with the Gladiolus in this country was Dr. Walter Van Fleet, who is perhaps better known to the world for his Chestnuts and Roses. He made many Gladiolus crosses, particularly with the wild species as parents, and produced some interesting and remarkable seedlings. Very few of these were introduced, for he held to a very high standard of excellence for his introductions, an example which most of the present-day Gladiolus breeders might heed with profit. His outstanding contribution is Princeps, reared in 1893 from G. cruentus, the large, wide-open, round-flowered, blood-red Gladiolus species crossed with one of the Childsi varieties. Its very large, brilliant scarlet blossom with conspicuous white throat has the form of the flower of the species and is a truly striking flower to-day in any company. The variety also has remarkable vitality, and has developed none of the constitutional weaknesses which have characterized many of the largest flowered kinds both in this country and abroad. Despite its hesitant opening of the

blooms, only two being open at once, it has been used successfully by breeders in developing many new varieties.

Van Fleet also used G. primulinus for crossing when it was first introduced, and learned more about its possibilities in breeding with other Gladiolus than has any one since his time. His Sunbeam, a clear, light yellow Primulinus hybrid with the usual hooded bloom and slender, open habit of its race, is the offspring of a cross between Sulphur Queen and G. primulinus. Of his many other seedlings, Mastodon, a vermilion seedling from Princeps, and his Autumn Giant, offspring of Princeps and the late-flowering red species, G. quartinianus, were startling flowers in their day. His scientific studies with the species revealed some interesting things about their behaviour in breeding, and would well repay careful study, even at this late date.

It is sometimes difficult to trace clearly the effect of one man's work in inspiring others. The fine contributions of J. A. Kemp to the Gladiolus world are clearly a direct result of Doctor Van Fleet's stimulating influence. Kemp first met Doctor Van Fleet when in 1897 the Doctor went to Tennessee, taking with him several thousand Gladiolus bulbs. The beauty of their flowers and the enthusiasm of Doctor Van Fleet fired Mr. Kemp with a

desire to take up the growing of Gladiolus and to become a breeder. Accordingly he joined Doctor Van Fleet at Little Silver, N. J., in the spring of 1900, and spent three years working with him. At that time there were no good, dependable pure white varieties, all of them being weak and of poor constitution. Seeing Doctor Van Fleet's fine results from crossing Princeps with the Childsi and other strains, Mr. Kemp undertook to develop vigorous pure whites from crosses with Princeps. About 1901, he began by crossing it with a white Gandavensis hybrid from Europe, and first produced a lavender-pink seedling, Mrs. John Turnbull. This he again crossed with another white, and secured seedlings of all colours, but no whites. By continuous breeding of the palest of the resulting seedlings among themselves, he finally succeeded, after nine years of effort, in producing some pure whites. Albania, White Wonder, and Early Snowflake were derived from this stock. These were apparently not all from the same cross. Mr. Kemp stated that Albania was descended from Europa, Early Snowflake from Giant White, from which it may have gotten its long, rather slender petals; and that White Wonder gets its fine petal substance from Mrs. Francis King. These were introduced in 1921, twenty years after he first started his breeding work with Doctor Van Fleet.

Viola Bird is a slender and small violet-tinted miniature Primulinus.

W. H. Phipps is an example of the extreme show type having many open blooms on a long spike.

Giant Nymph is one of the best of the Primulinus Grandiflorus.

Not only was he successful in his main aim of producing sturdy whites; but his most outstanding introduction, Pink Wonder, the flowers of which are of a delicate soft pink, of fine form and enormous size, is also a result of this same line of breeding. Pink Wonder is essentially a Show variety, and the new lavender Jubilee, which Kemp values as his best, is similar; while Albania and White Wonder belong in the commercial class. Kemp has used others of Doctor Van Fleet's Gladiolus besides Princeps for his breeding work, and has some fine Primulinus seedlings from Sunbeam. One of his latest introductions, Ruffolace, is of a new type. It is pure white and very prettily frilled and laciniated, the finest of these fringed petalled varieties yet introduced.

Leonard Joerg is another of the pioneer growers of Gladiolus in this country. He was a grower and breeder for the Hallocks of the Childsi strain, when the first of these were brought over from Europe, and he and his son, George J. Joerg, have maintained an interest in the flower ever since. In 1922, he startled the Gladiolus growers and breeders by exhibiting a prize-winning variety of his own, of fine size, substance, and form. Joerg's White is a product of a fortunate cross between two of Pfitzer's varieties, Die Keiserin and Fraulein Betty Keuschler. It has large lily-shaped, wide-open

flowers, well spaced on a strong, erect stem. The petals are rather long, with broadly rounded ends. They are all pure white except the lowermost inside petal, which has a blotch of creamy yellow with crimson veinings. The flower, being of the one-spot type, with the upper petal outside of the two lateral ones, opens to a much rounder bloom than do most Gladiolus, and all of the petals are of about one size. Thus it is quite regular in form. Joerg's White is a distinctive novelty and clearly represents the ideal flower of its introducer, so that we may confidently look forward to other Show sorts of this same type from this Long Island grower. Other fine things of Joerg's introduction are Joerg's White Prim, Joerg's Yellow Prim, and George J. Joerg, a pretty salmon pink.

Leaving the Long Island and New Jersey pioneer centre of Gladiolus activities, let us look in upon the work of the New England growers. There are probably more Gladiolus growers and enthusiasts per square mile in and around Boston than anywhere else in the United States. Of these none has applied himself more ardently to its culture and improvement than has Eugene N. Fischer. One might even assume that he had inherited this interest. His father, Wm. N. Fischer, who was landscape gardener in Central Park and later in the Boston Park Department under Frederick Law

Olmstead, was likewise an admirer of Gladiolus, and had a collection of several thousand, mostly seedlings of his own. From about 1890 on, Eugene Fischer had charge of his father's collection, and from selected ones of these he started his own strain.

As a result of his studies of art both in this country and abroad, Mr. F scher is particularly well qualified to select among his seedlings those that are the most perfect in form and colour. He is constantly collecting the best new varieties from all sources, and some of Lemoine's recent introductions are among his favourites for hybridizing. He is a careful worker and always makes his crosses with some definite aim in view. A painter as well as a breeder of flowers, he has made a series of one hundred and fifty coloured pictures, in which he traces the history of the Gladiolus from the earliest known wild species of Africa up to the present day. Both his pictures and his flower creations can be relied upon for their fine form and colouring. He has worked particularly with the large-flowered amaryllis type, derived from the variety Princeps, and with the Primulinus hybrids, among which he has been successful in bringing out some beautiful tones of yellow, buff, orange, and pink.

Among his large-flowered sorts, his Mrs. F. C. Peters is a handsome Show flower, rosy lilac with a crimson blotch. His other varieties are mainly

of the general purpose commercial type of flower. Sophie Fischer is a large pink of good substance. Henry C. Goehl is a grandchild of Princeps; it has the large, rounded, wide-open flower and broad firm petals of that variety, but the colour is white, slightly blushed pink, with a deep crimson blotch. This is the outcome of another effort like Kemp's, to breed a pure white Princeps, and the result is a truly handsome flower, though not white. Two others which show probable relationship to Princeps in their form, at least, are Mrs. Wm. E. Clark, a delicate shell pink of medium size with bright crimson and garnet blotch, and Sunneymede, which combines the wide-open, rounded flower of the amaryllis type with small size and a rare shade of orange colouring derived from Primulinus ancestry. Its vivid crimson blotch combines agreeably with its orange colouring. This variety has a future because of its pleasing form and distinctive colouring. Of Fischer's Primulinus hybrids, his Miss T. Rose, a creamy yellowish pink, and Ethelyn, an orange yellow, are good examples of the dainty colouring which characterizes all of his varieties.

L. Merton Gage is another successful New England breeder who has worked with both the amaryllis-flowered and the Primulinus types. His Tavistock is a scarlet resembling Princeps, but with as many as six blooms open at one time in-

stead of two. Maurice Fuld is a truly remarkable descendant of Princeps, notable for its monster size, taking first prize at the New England Gladiolus show in 1924 for the largest flower in the show. It is truly a Show flower. Like Princeps, it opens few flowers at once, but the one or two are of such size as to command attention. The colour is rose dorée with a deep rose blotch, broadly bordered white. Marjorie Gage, a large-flowered pure white with scarlet blotch, is a seedling from Mrs. Frank Pendleton. Gage's most outstanding Primulinus hybrid is Alma Gluck, peach red with a red-lined sulphur-yellow throat. It is hooded, like all the Prims, but is large, with upstanding blooms that look you in the face.

Clark W. Brown, widely known for his admirable work on Gladiolus nomenclature, has also produced a number of new sorts, among which the most popular is Tiffany, a pure white, wide-open Primulinus derivative, with graceful carriage and slightly ruffled petals of excellent substance. It has great promise as a moderate-sized white for general use. Melba, creamy salmon tinted orange yellow in the throat, is also an attractive sort.

Many other New Englanders have been and are producing fine new Gladiolus seedlings. Spencer, Meader, Rowe, and several more have each introduced one or more new varieties of high merit.

Developed in a region of moist, equable summers, favourable alike for flowers and people, these New England productions cannot invariably be recommended for culture in the Middle West without very thorough preliminary trial. Some of them will stand the dry, hot summers of the corn belt, but they do not require any such qualifications to make good both in New England and on the seacoasts. One must choose one's assortment of varieties with some thought to the climate in which they will be grown, if the very finest performances are to be expected.

The inland Gladiolus hybridizers have in general developed the most rugged and thoroughly dependable strains, because they had to be resistant to dry heat in order to make good as seedlings there. This does not mean that they will make as handsome display flowers in more favoured localities as will the sorts developed in milder regions. Most of them will not. But their sturdiness is a strong recommendation for them, especially to the beginner in Gladiolus culture.

The leader in this Middle Western group is Anthony E. Kunderd, both because he was one of the first introducers of new sorts especially adapted to our inland empire and because of the number and high merit of his productions. He has introduced more good varieties that are well known

and well liked than any other man of to-day. He first began growing Gladiolus fifty years ago, when he was a small boy, and gradually extended into raising seedlings and hybridizing. Noting that a number of the old Gandavensis sorts of that early time had lightly wavy or frilled petals, he conceived the idea of intensifying that trait. Starting with these, by breeding and selection among them and among the wild species, he finally secured a truly ruffled form and introduced it in 1911 as his amber white Kunderdii Glory. This variety, though rather coarse in texture, has the rugged vigour, full rounded petals, and lasting substance which have characterized most of his later introductions. Some of his most popular fancy ruffled sorts are Purple Glory, a large maroon red; E. J. Shaylor, rose pink; Mona Lisa, a delicate pale pink. A very engaging, little, intensely ruffled Prim of recent introduction, and consequent high price, is Golden Frills. His plain petalled varieties, with the same tough substance and regular rounded form of his ruffled sorts, are among his handsomest productions. Robt. J. Kunderd, orange scarlet; Mrs. Dr. Norton, a delicate blending of pink, white, and light yellow; Marshal Foch, showy large light pink; Dr. Walter Van Fleet, a very tall and slender pink variety; and Mrs. Frank Pendleton, white, flushed light rose pink, with large oxblood red blotches on

the lower petals, are a few of these. He has also produced several meritorious Primulinus hybrids; among these are Alice Tiplady and ruffled Butterfly and Ming Toy. Space would not permit of even a brief mention of the scores of fine Gladiolus put out by Kunderd during the past fifteen years. Many of these have made good as commercial sorts for general culture. Recently he has introduced a new type in his tawny old-rose Lacinatus, a slender, spidery flower with the petals irregularly slashed and notched. This may be the forerunner of a new race as popular as the Ruffled strain, and the new Laciniated varieties in different colours which are now promised will be watched with interest. There has been for a long time a place for graceful miniature Gladiolus which has not been adequately filled by the Primulinus hybrids, because their sleek hooded blooms are not quite as artistic as would be a more open and more feathery one. Perhaps the Laciniated type, in greater variety and pleasing colours, may fill this want.

Kunderd has done much to advertise the Gladiolus and to give it the prominence it has to-day in the eyes of the American public. His latest innovation is a set of moving pictures, showing the work of the Kunderd Gladiolus farm for a year. These depict the operations of one branch of a huge

industry in this country, for hundreds of acres are devoted to the growing of Gladiolus each year.

Mrs. A. H. Austin has done as much for the æsthetic side of the Gladiolus as has Kunderd for the commercial side. Her lectures, her judging at the shows, and her writings have kept people abreast with the newest developments. She has also done much hybridizing and has originated some distinctive commercial sorts, with long, graceful spikes of openly spaced and well-formed blooms. Her pink Evelyn Kirtland, mauve Herada, and flesh-pink Rose Wells; Tyco Zang, deep pink with creamy throat, salmon Wamba, white Bertrex, and deep red Cardisan combine a tall graceful habit and pleasing form with the sturdiness required to cope with Ohio summers. She has recently introduced some deep yellows and some attractive little ruffled Primulinus varieties, some of which look very promising.

Carl Betscher is one of the many breeders who have used Van Fleet's Princeps effectively in breeding to improve the Gladiolus, and his newest, late-flowering, red variety, Cruentus Superba, is evidently derived from that source. Betscher might be termed a born plantsman, as he made himself a garden at the tender age of ten. In his breeding work he has dealt with Carnations,

Cannas, Dahlias, and Peonies as well as Gladiolus; and he is a commercial florist besides being a grower and hybridizer. So it is not surprising that he has not been especially prolific in new Gladiolus. But he has been discriminating, and his productions are of high merit. His aim has been toward commercially valuable sorts, of strong constitution, good size, and substance. His Crimson Glow, a bright red that glistens in the sun, is one of the best. He has used the wild species of Gladiolus somewhat in his crossing. Gladiolus dracocephalus, the Dragon's-head Gladiolus, has given him some interesting lined and spotted seedlings; Gloriosa, yellow with cinnamon markings, is one of these. He has also used G. leichtlini, a very early-flowering desert species from the Transvaal and crossed it with the earliest flowering of the Primulinus hybrids. He has already introduced his Canori, an early yellow Primulinus. His earliest-flowering seedlings are not yet generally in the trade, but are claimed to be *very* early, which is entirely credible. Lemoine also produced very early sorts about twenty-five years ago by crossing G. leichtlini and G. aurantiacus with his earliest Lemoinei varieties. One of these, Precocite, was reported by Hottes at Cornell as flowering in forty-four days from the date of planting! But this, like so many European varieties, proved a poor grower in this country.

Betscher's sorts, originated at Dover, Ohio, adapted to the trying summers of the Middle West, and selected for vigour and sturdiness there, may be expected to give a good account of themselves almost anywhere.

The partnership of Dr. C. Hoeg and Kristian Prestgard is one of the few instances of a successful coöperation of either plant breeders or inventors. They began hybridizing the Gladiolus in about 1905, and have apparently worked amicably together for twenty years. Both men have other occupations, one as a doctor and the other as a newspaper editor, but they have found time to produce some fine new sorts, which they have sent out from their home at Decorah, Iowa.

Some of Doctor Hoeg's best are Gold, a very fine pure yellow; Jenny Lind, a soft apricot pink with pale yellow throat, of moderate size but with many open blooms; and Titanic, a lilac purple with white lines in the throat. Among the finest of the Prestgard varieties are Mrs. Kr. Prestgard, a showy pure white of sturdy growth; Jap Lady, a dark pinkish lavender; and Carmen Sylva, a well-known and universally admired large, wide-open white of fine substance, with tall upstanding spikes, equally good for exhibition and for general commercial use.

Joe Coleman entered into Gladiolus breeding quite recently and as a mature man. In the last

ten years he has produced some fine ones. He works in the conventional way, selecting the largest and most striking sorts as parents for breeding, and deplores too great a use of such primitive types as the Primulinus species. His Minuet, a clear, sparkling lavender, was a 1923 medal winner. Giant Nymph is an extremely large Prim and has a tall, open spike of light rosy pink blooms shading to cream at the centre. Mrs. P. W. Sisson, cameo pink, is a Show flower of fine size and clear colour, winner of the Sisson prize in 1924. Sweet Lavender, a large pale lavender with deep red blotch, is a very early bloomer. Catherine Coleman is a large and showy coral pink with dark blotch. His introductions to date do not conform to a distinctive type as do those of some of the older breeders.

Vos, Vaughan, and several other florists have also introduced occasional fine Gladiolus, sometimes of their own origination, sometimes theirs by purchase. Vos's Chateau Thierry is a pretty cerise and his white Maine is another good one. Vaughan for many years introduced Van Fleet's fine seedlings. The new Vaughan's White is a good pure white.

Wm. Purple (or Gladiolus Bill as he prefers to be called) has worked quite steadily for larger Primulinus hybrids, with large, rounded, and wide-open flowers, but with the slender, graceful habit of the

Primulinus. Opalescent, palest lavender, and Starlight, a cream-coloured early-flowering Primulinus hybrid, are among the good ones. Several of his are attracting favourable notice, and he has some very promising new ones coming on.

There are many Gladiolus growers and breeders scattered all through the broad plains between the Appalachians and the Rockies, and several of these have produced one or two each of outstanding sorts. But it would be both difficult and tedious to try to evaluate the work of each from one or very few of their introductions. A few of these of proven merit may be mentioned: Wright's lavender Louise, Zeestraten's red Diana, Boynton's pale lavender Capt. Boynton, and Umpleby's wee little Prim, Viola Bird.

The climate is one of the popular topics of conversation on the Pacific Coast; and within very narrow geographical limits one may choose one's own, of almost any sort, from drenched coast to desert valley, and from palm-studded lowland to snow-clad peaks. But the narrow strip of the coastal plain, with its mild, cool, moisture-laden air, has proven particularly suited to the growing of many kinds of bulbs, including Gladiolus, which thrive remarkably there. The Pacific Coast Gladiolus breeders are located in that narrow belt, and it is with it and it alone that we have to deal in

discussing this region. Luther Burbank was the one outstanding plant breeder of California who was far enough inland to get a little of the effects of the California valley summer, which at its worst is more severe than that of the Mississippi valley.

W. E. Kirchoff, after a lifetime of Gladiolus growing and breeding at Pembroke, New York, has retired to the California coast, and continues to originate Gladiolus there. So his earlier introductions—white-throated scarlet Principine, creamy white Pembroke, and the sturdy little Kirchoff's Violet—all were originated in the East. Some of his best work has been among the yellow and violet sorts, and his main aim in these as in all is for pleasing self colours, without blotch. His newest introductions, like Mrs. W. E. Olmsted, a large and showy yellow, grew up in the mild, moist atmosphere of the Coast, which lets each bloom grow to its fullest, bringing forth flowers of remarkable size and beauty. Under such conditions, the weak and the strong are not clearly differentiated, all kinds having a good chance to show their best. So these new Pacific Coast varieties, such as those of Kirchoff and others, have yet to stand the acid test of the searing winds of the interior. Some will probably prove admirable, others may miserably fail under such treatment. No better testing

grounds for severe conditions to Gladiolus could be found than in the central valley of California.

Just as Kunderd is the most prolific producer of new Gladiolus in the Middle West, so Richard Diènер is the outstanding figure among the Gladiolus breeders of the Pacific Coast. He, like Kirchoff, is located on the mild, cool, coastal strip of California. His home garden is further protected by being in the lee of Mount Tamalpais and sheltered by it from the winds off the sea. No greenhouse ever had more pleasing climatic conditions than the out of doors in Diener's home at Kentfield. There he has developed a distinctive Show type, of tall and very floriferous varieties with immense, long-petalled, closely ranked flowers. These have caught the showmen's fancy, and rightly so. Several of his, but not all, have demonstrated the vigour and productiveness demanded of a good general-purpose Gladiolus.

Diener entered the field of Gladiolus breeding in 1912, though he had been associated with the industry before that in Long Island and elsewhere. His aim is toward larger flowers, taller plants, and more blooms open at once on the spike, and he was so successful in even his early work that he achieved a Medal of Honour at the Pan Pacific Exposition in 1915. One of his showiest is his American Beauty, which opens up a dozen or more large, deep

rose-coloured blooms at once. Mrs. Leon Douglas has a very large flower with a ground colour of begonia rose striped with flame and scarlet. Its large flowers, wide open and well set on a long spike, make it a good Show variety. The Gladiolus which won first place in the recent American Gladiolus Society symposium was Diener's Mr. W. H. Phipps. Its colour is pink overlaid with light rose salmon. The flowers are enormous and borne in great profusion, there being many of them open at once on the spike. Diener has also worked with the Ruffled strain of Gladiolus. His William Kent, creamy shell pink with golden ochre centre; Mrs. H. E. Bothin, light geranium pink with scarlet blotch; and smoky old-rose Rose Ash are all prettily ruffled. The last is a handsome flower, but the blossoms are a bit apt to wander around the spike, facing irregularly in different directions—a fault not uncommon among the largest and most vigorous varieties. It is an inheritance from the tallest and strongest of the wild parents of the Gladiolus, G. oppositiflorus, and is an annoyingly persistent trait. Geraldine Farrar is a pale lavender violet, one of the best of this colour, having several blooms open at once and of good size. Several of Diener's varieties have already attained standing as good strong commercial sorts. Among these are Anna Eberius, a deep rosy purple of fine size and texture;

(Upper) Kemp's Jubilee, pale lavender, is a fine show flower because of its size.

(Lower) Golden Measure (Kelway) has held its place as the preëminent yellow sort for nearly a generation.

(Upper) Veilchenblau (Pfitzer) the best of the deep bluish violet coloured gladiolus.

(Lower) Desdemone, a Nancy variety from Vilmorin, has the usual striking markings and distinctive colouring of the French sorts. Its smoky old rose tint is emphasized by its strong throat markings.

and Richard Diener, a pure geranium pink with a light sprinkling of ruby on a creamy yellow throat. The latter is also a good Show variety with large blooms and many open at once.

Carl Salbach is one of the newcomers among the Gladiolus breeders of the Pacific Coast. His work with Dahlias was already arousing comment when he first issued a Gladiolus catalogue in 1922, and now his Gladiolus introductions are rapidly gaining recognition. Sydney Plummer is a beautiful soft yellow, suffused delicate pink with amber and purple throat. Its large blooms are slightly ruffled. Claremont is a clear light yellow with a deeper yellow throat. Llewellyn, a light rose pink with soft cream throat, is a seedling of Pink Lily (Kunderd) and is heavily ruffled.

Sprague, Houdyshel, Briggs, Ellis, and other Pacific Coast breeders have entered the field so recently that no just estimate of their work is possible. But from the past performance of other varieties from the same general region, we may expect them all to thrive in the moist atmosphere of both the Atlantic and the Pacific seaboards, and some of them, when grown under the most favourable conditions, will make showier flowers than will many of the best of the mid-western introductions grown under equally cool and moist conditions. They cannot all be expected to prove equally

thrifty in regions of dry hot summers. Hot winds from the west may occasionally wilt them even on the Atlantic Coast.

Most Gladiolus can be grown almost anywhere, and they will make a good showing of flowers under most trying conditions. But when one goes to special effort to get some of the finest sorts, it is fair to expect results accordingly. In order to get any Gladiolus to live up to the best reports of it, it is needful to give it surroundings that suit it. Thus the varieties from the interior in general like warmth and enjoy the full exposure of the open fields; those from the Pacific Coast and from the shores of New England are apt to thank you for the protection of a more sheltered garden, and to repay the extra care with very fine blooms. Of course, simply because a variety originated in a mild location does not mean that it is only suited to such places. A camel, born in the bogs of Ireland, would still be a camel, and still be fitted for the desert. So a Gladiolus from a mild coastal climate, because of its heredity, may be well suited to the dry and hot interior; and there are also instances of sorts from the Middle West, reared in specially protected surroundings, that are no more heat and drought resistant than the tenderest of the coastal sorts. Nevertheless, we may confidently look to the Middle West for our most heat-resistant sorts, and to

the coasts for the best and showiest for cool and moist places. In the same way, we may look to Kunderd for Ruffled Gladiolus, to Fischer for delicate tints and artistic colour combinations, to Diener for the huge Show spikes, and to Betscher for the earliest flowering kinds. Some have consciously set for themselves such ideals, others have unconsciously evolved a type which they are now developing, still others have no apparent clearcut aim, but are selecting whatever may look promising at the moment. All are steadily adding to the variety, adaptability, and general usefulness of the Gladiolus, and making it, what some already proclaim it, the King of the midsummer flowers.

CHAPTER III

PLANTING TIME

HAVING acquired a collection of Gladiolus to suit our needs and our purses, we wait impatiently for the beginning of the planting season. The wait need not be a long one, for the first deceptively warm days, when we feel the whole outdoors calling us, are just right for the early planting of Gladiolus. Occasional late frosts are not a serious menace to them.

While we are waiting for favourable weather, we can save ourselves some later disappointment by giving a little attention to the new arrivals among our bulbs, as they come from the dealers or growers. First of all, it is a good plan to unpack them as soon as they arrive, and to examine them for quality and condition before storing them in the cool cellar to await planting.

Gladiolus bulbs are so easily grown that most of those you purchase are apt to be good sound ones. But there are differences among them for all that, and if we want the handsomest flowers, we not only need the best varieties but the best bulbs of them. Before discussing their fine points, we will perhaps

(Upper) Scab spots on the husks of a gladiolus bulb.

(Lower) Typical dry rot injury to a gladiolus bulb.

save ourselves some confusion by looking into the makeup of the Gladiolus bulb a bit. What we call the bulb is really not a bulb at all, according to the

Fig. 1. Side view of a bulb of a Primulinus hybrid, showing its development at blooming time. The slender roots attached to the base of the old bulb are the first feeding roots. The thick fleshy roots coming from between the old bulb and the new one are the storage roots. The small ascending sprouts from the same part of the plant are young bulblets, which in this case are on long stalks, characteristic of the Primulinus race.

botanists. It is a swollen, fleshy knob of a stem, and should really be called a corm. It is a part of the *cormus*, which is Latin for a stem, but let us call it a bulb anyway, as the word is easier to say and understand. The bulb, then, is covered with

one or more layers of brown scales, which are the bases of last year's leaves. If you are curious about the structure of the bulb, you may peel

Fig. 2. Lengthwise section of a Gladiolus bulb and lower part of the stalk of a large-flowered sort, showing the structure of the plant.

these off. Under them are one or more buds or eyes for next year's growth. The bulb we buy is just the swollen, fleshy last year's growth of underground stem. At its base is the scar where the old dead previous growth was broken off. Its top is

pointed, at the place where last year's leaves were cut off. This is the point at which the new sprout may also be expected to appear. If the bulb has blossomed before, the old flower stalk is apt to appear as a pithy stalk at the centre of the cut stem. The size of the scar at the base also tells something about the age of the bulb. If the scar is big, it came from a large bulb the previous year (see figure 3, page 137). Sometimes the scar is very small, a mere pin point buried in the rounded base of the bulb. This means that the bulb is young, and grew from a small bulb or wee bulblet last year. This is of interest, because some varieties, like Golden Measure, Orange Glory, and others of the large kinds, flower best from mature bulbs, while other sorts do splendidly from very young and even rather small bulbs. Another way to tell about the vigour of a bulb is by its growth the previous year, just as you may judge of the vigour of a tree by the length of the new growth. In the case of the bulb, since it is all new growth, this may be measured by the depth from the scar to the pointed tip. If this depth is great compared to the width of the bulb, then it is a good strong one. A flat bulb is not so good as a plumper one. For the very best results, the bulb should also be large, an inch and a quarter or an inch and a half or larger in diameter. The size depends on the variety as well as on the

growth. Some of the bluish sorts always have small bulbs, and bulbs of other varieties, like Mrs. Frank Pendleton, Peace, and many of the Primulinus varieties, grow to simply huge size, two or even three inches in diameter. A bulb an inch and a half or over in diameter is called a first size or Number One bulb, and this size is usually preferred for producing the best blooms. Bulbs three quarters of an inch in diameter are apt to produce flowers, but fewer of them and of smaller size.

Having assured ourselves that the bulbs are big and strong, let us look a little into their bill of health. Fortunately, Gladiolus ills are few and not difficult to detect.

Most of our garden pests—caterpillars, aphids, scales, mildews, etc.—give little trouble with Gladiolus. Neither is their slightly bitter sap attractive to the wandering cow. But there are three diseases peculiar to the Gladiolus and they are probably as old as the Gladiolus itself. I have found some of them even on wild bulbs newly collected from central Africa. These diseases are carried on the bulbs and also will winter over in the soil. The same preventive and curative treatments are recommended for them all. It is a good plan to watch for them on your newly purchased bulbs as well as on those of your own growing. They are called dry rot, hard rot, and neck rot or

scab. All three of these diseases weaken the bulbs and lower their value, as well as kill each year a few of the ones most severely attacked.

Dry rot is due to a fungous growth, which causes reddish brown or black decayed spots on the bulbs. These are more or less circular in outline and are sunken, with raised margins. They are most frequent on the lower part of the bulb, near the old bulb scar, where they have spread from the old bulb the previous year, and can usually be detected by peeling off the outer scales and examining the base of the bulb. If there are dark, sunken spots of corky dead tissue with a slight raised rim around each, that is dry rot. If the bulbs are severely infected when they are planted the disease may kill the growing plants, causing them to turn yellow and fall over when partly grown. Also, the disease can live over in the soil by means of the minute black masses, or sclerotia, that form on the bases of the decayed leaves. If the dark diseased spots are found on the bases of purchased bulbs, it will be a kindness both to the grower and to yourself to return them to him, with a request for replacement by healthy bulbs. This disease will winter over in the soil as well as on diseased bulbs, so it is best not to plant diseased bulbs in the garden.

Hard rot is another fungous disease of Gladiolus, and it attacks both the leaves and the bulbs. The

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symptoms in the two cases are so different that they have often been attributed to entirely different causes. On the bulbs the disease forms hard, horny brown spots, often surrounded by an area that appears watersoaked. The Gladiolus has built up a considerable ability to resist this malady, and its spread on the bulb is often checked by a layer of cork built up around the diseased area. This stops its spread so that the diseased spots may be just small, hard, dead-looking masses, which may be lifted out with the point of a knife, leaving shallow depressions. The disease attacks either the base or the top of the bulb. It may enter from the old bulb, thus starting at the bulb scar, or may first attack the leaves, then be washed down to the top of the bulb by the rain. The disease on the leaves produces a rusty appearance, which will be discussed more fully later, in connection with culture of the Gladiolus. Hard rot is especially severe on young plants grown from seed or from bulblets, and is therefore apt to occur in commercial bulb fields. So it is a good plan to watch for it with care among the newly purchased bulbs.

The third common disease of Gladiolus bulbs is scab or neck rot, which is caused by a bacterium, B. marginatum. It is the most conspicuous and most easily detected of the three principal Gladiolus

maladies. Scab is especially destructive to mature bulbs, and for that reason is of particular interest to the amateur grower. The most evident symptom of it is the presence of black, burnt-looking streaks on the bulb scales, which split apart, leaving blackened margins to the breaks. If you peel off the affected scales, you are apt to find that they are stuck fast to each other and to the bulb by a hard, varnishlike substance. Under the diseased spots on the scales the bulb usually has black dead spots, and if these are large they are usually covered with the varnishlike secretion. In severely attacked bulbs, the diseased spots are joined together, and the whole affected area looks rough and scabby. This appearance has given the disease its common name. This disease also causes decay of the lower leaves at the ground level, and in this stage is known as neck rot, which will be discussed later under culture.

The foregoing discussion of diseases may seem to over-emphasize dangers which are really neither frequent nor acute. Most of the Gladiolus bulbs in the trade are healthy, being thrifty young bulbs grown quickly from bulblets, and probably less than one in a hundred shows any trace of disease. But it is a good plan to know about these maladies and to guard against the occasional sick bulbs. If particularly choice bulbs become infected with

either of these troubles and they are considered too valuable to destroy them, there are means of treating them with considerable prospect of success. If the disease is confined to the scales and the lower part of the bulb, peeling off the bulb scales will help to prevent the spread of the disease into the new bulb during the next season's growth. But it is a better and surer practice to disinfect all lots of diseased bulbs. For this purpose mercuric chloride or one of the new organic mercury compounds, such as Uspulun, Semesan, or Germisan, is to be recommended. Mercuric chloride (corrosive sublimate) may be used in the strength of one part of mercuric chloride to one thousand of water by weight, and the bulbs may be soaked in this for about twenty minutes just before planting them. Rinse them in water immediately after the treatment. If either of the organic mercury compounds is used it may be made up to a 2 per cent. solution, in which the bulbs may be safely soaked overnight. Whichever treatment is used, it is a good plan to peel off the scales of the bulbs before treatment, to make sure that the liquid will come in contact with the diseased parts of the bulbs. Of course, it is understood that these disinfectants are all strong poisons and the usual precautions should be taken to keep them away from animals and young children.

Kemp's "Ruffolace" is a ruffled and laciniated pure white—one of the most attractive of this fancy type of flower.

It is a good plan to plant all diseased bulbs in a separate part of the garden, away from the other Gladiolus, for one or two lots of diseased bulbs can, by infecting the soil and spreading the germs among the sound plants, raise havoc with a fine collection of Gladiolus, as many growers have learned to their regret. So I buy bulbs freely and from many sources. I usually get nice sound ones—but I examine them all.

Having assured ourselves of good, healthy, strong bulbs to plant, the next thing is to choose a proper place to plant them. Here it is well to recall the salient features of the native home of the Gladiolus. Its forbears must have liked the conditions in South Africa, else they would not have attained such an amazing development there. It is a sunny land, moderately well watered during the growing season, but seldom overwet at any time, and it is dry during the dormant season. Regions of light and seasonal rainfall frequently have deep, fertile soils, rich in mineral salts, and lacking the acidity characteristic of our more humid, leached-out lands. Keeping these conditions in mind we do well to choose a site that will most nearly duplicate them.

First, let us choose an open, sunny place, with well-drained soil, and a good distance away from large trees or shrubs, the roots of which would rob

the soil both of moisture and nutriment. In common with most plants from the semi-arid belt of the earth, Gladiolus like neither shade nor wet feet. To be sure, if only a wet and partially shaded location is available, it is possible to choose kinds that will stand these conditions better than others. Some of the Primulinus hybrids are notably tolerant of both shade and wet soil. One of their ancestors, the Maid-of-the-Mist, is from the tropics, and is not a desert plant. But even these Primulinus hybrids prefer a sunny and well-drained location.

If it can easily be avoided, it is best not to put Gladiolus on the same soil year after year, for this encourages disease. But if care be taken that only sound bulbs are planted, Gladiolus can be grown on the same land year after year without seriously depleting the soil, for the Gladiolus is not as hard on the land as are some crops.

A rich, deep soil of loose texture is to be preferred, and deep ploughing or spading will help it. Many growers prefer a sandy loam, but almost any type of soil may be used with good success. As may have been inferred from their native habitat, Gladiolus do not like a strongly acid soil. To be sure, they will tolerate bad conditions rather better than will most garden flowers. But strongly acid soils seem to favour Gladiolus diseases. Most

growers also advise against heavy liming for them. Probably the best condition is a soil only slightly acid. If it is in prime condition for lettuce, beets, peas, and other garden crops, it will grow good Gladiolus, providing it has not been dressed too recently with fresh stable manure. Fresh and strong manures are injurious to most bulbs and Gladiolus are no exception to this rule.

If the soil is strongly acid, so that it supports only a growth of Sour-grass, Sorrel, and Moss, then lime will benefit it. Gladiolus can do without lime, but very acid soils are objectionable. Where lime is needed, it is best to apply it in the autumn, so that it can thoroughly permeate the soil by planting time in the spring. Also, do not overdo the lime. Too much is as bad as too little. A ton of lime to the acre, applied in the fall, is enough for two or three years, even on a strongly acid soil.

For those who wish to go into the matter a little more deeply, the following advice may be helpful. Many people are familiar with the use of litmus paper for testing acidity, and this may be used for testing soils. It turns red when it is acid, is blue when alkaline, and bluish pink when neutral. But if a soil is acid, litmus paper does not tell us *how* acid it is. For Gladiolus we want an acid soil that will turn litmus paper red, but we do not want it strongly acid. Litmus paper tells us nothing about

that. So litmus paper is useful, but a more delicate test will be better. Fortunately, agriculturists have recently developed some soil tests that are as accurate as they are easy. One very good one is Soiltex, a coal-tar dye that is orange yellow when strongly acid. With decreasing acidities it turns successively lemon yellow, greenish yellow, and green. When it is neutral it is blue-green, and when alkaline a bright blue. This dye, with an outfit and full directions for use, is supplied by the Albert Dickinson Co., of Chicago, at a cost of one dollar. The dye is supplied in a small flexible metal tube. A colour chart is provided with the outfit, and some oiled papers on which to test the soils. To make a test, crease one of these papers into a trough and put a little of the soil on it with the point of a clean knife. Do not use the fingers as that would spoil the test. Then squeeze a little of the liquid Soiltex on the paper until the soil is completely moistened with it. Allow it to stand for a minute, then tilt the paper so that some of the liquid collects at one side of the lump of soil. By matching the colour of the liquid with the colours on the chart, one can tell precisely how acid the soil is, and approximately the amount of lime required. When the soil turns the Soiltex a bright green, then it is just about right for most crops, including Gladiolus. If it is more acid, then use the

Joerg's White, a remarkable variety with well-formed flowers of large size and equal petals.

smaller amount of lime recommended on the chart. A ton of lime to the acre is equal to nearly a pound to twenty-two square feet. If, on the other hand, the soil is too alkaline, this may be helped by sprinkling a little sulphur on it, or using ammonium sulphate instead of nitrate of soda in the fertilizer. A single tube of Soiltex is ample for a hundred tests, so they can be made frequently, if there seems to be any question about acidity. All of these precautions are not necessary for Gladiolus, as they will grow very well in soils that support good Corn, garden vegetables, or flowers. But the conditions here recommended for Gladiolus are likewise beneficial to most garden crops, and will improve their growth as well.

If the soil for the Gladiolus has been manured and ploughed or spaded deeply the previous autumn, that is excellent. Liming likewise can be done most advantageously at that time. In regions where the ground freezes hard in winter, fall ploughing destroys many cutworms and wireworms. The soft-bodied, dust brown or gray cutworms, with striped backs, are caterpillars of a moth which lays its eggs in weeds in the late summer and autumn. The young worms hatch out and bury themselves in the surface soil where they are protected by the covering of weeds or sod during the winter. So fall ploughing kills many

of these pests. If not killed off, cutworms are troublesome among Gladiolus, as among most crops. They eat off the young sprouting plants at the surface of the ground early in the spring, and some of them climb the plants and eat the leaves and young flower buds later in the season.

The hard-shelled, brown or whitish, slender, tough wireworm with its jointed shell is the larva of the click beetle, which eats into fallen fruit in the late summer. The wireworm lives in the soil two to five years before maturing into the beetle, and subsists on the roots of grass and the underground parts of other plants. It will tunnel through and ruin Gladiolus bulbs, if the pest is at all abundant. Where wireworms are troublesome fall ploughing is advisable. Avoid newly turned old grass sod lands for Gladiolus in wireworm infested localities. Such lands are favourite breeding places for both wireworms and cutworms. If flower beds are badly infested with wireworms, then it is sometimes advisable to resort to cure as well as prevention. Many chemicals are recommended for killing insects in soil—tobacco dust, calcium cyanide, carbon bisulphide, formalin, and corrosive sublimate are all used effectively. Probably the easiest and least disagreeable to handle is naphthalene, commonly used for moth balls. Naphthalene may be worked into the soil at the rate of one

hundred pounds to the acre some time before planting, to kill off insects and animal pests in the soil. It is useful in combating root lice and other soil pests, as well as the worms.

Despite the opinions of many growers and fanciers to the contrary, Gladiolus are not heavy feeders and require only moderate fertilizing of the soil. Stable manure, preferably from the dairy barn, may be ploughed under in the autumn. Sheep manure, ground bone, and wood ashes are mild fertilizers, and may be used at any time; or a good chemical fertilizer, suitable for potatoes, may be worked into the soil and thoroughly mixed with the earth before planting. If chemical fertilizers are used, do not use too much, and above all see that the fertilizer particles do not come into contact with the planted bulbs. About a ton to the acre (about a pound to the hundred feet of row) is sufficient application of a high-grade chemical fertilizer. This may be applied on each side of the row, or may be mixed with the soil in the row above and below the level of the bulbs, but do not let it come into contact with the bulbs. It is apt to burn them and start decay.

Prepare the soil by ploughing or spading it deep. Eight or even ten inches is none too deep, providing the top soil is of sufficient depth. Of course it is not advisable to turn up too much of the raw

subsoil. This matter of deep preparation of the soil for Gladiolus is important. The English, who grow very fine ones, often trench the soil where their Show Gladiolus are to be planted then spade well-rotted manure into the subsoil before replacing the top soil in the trench. Thus the earth is stirred nearly a foot and a half deep, and is thoroughly pulverized. One hesitates to recommend so much hand labour as this to American gardeners, who have trouble enough getting the ordinary work done well. But I mention this to impress the value of deep and thorough working of the soil before planting. Gladiolus roots are formed under and around the bulbs, not above them, and they like a loose, open soil, well provided with both moisture and air. So break up the clods and make the soil fine and loose as deep down as you reasonably can before planting Gladiolus. Also, put the greater part of your fertilizer below the bulbs rather than above them.

The spacing, arrangement, and depth of planting of Gladiolus bulbs will depend on many things. But two essentials for Gladiolus are sunlight for the leaves and air for the roots. This means, avoid crowding the plants, and do not set the bulbs too deep. Full-grown bulbs of the large-flowering Gladiolus need room, and not more than two or three of them should occupy a square foot of

ground, either in beds or in garden rows. So in beds space them about eight inches apart each way. In garden rows, four to six inches apart is usual; close spacing of the plants will help them to support each other when in flower and make less staking necessary.

The matter of garden labels also deserves a little attention. If one has a considerable collection of different kinds of Gladiolus, then the problem of keeping them in order is a real one. This is most easily done by placing a stake in the row at the beginning of each variety, with the label facing toward the plants. Some people object to making their gardens into forests of stakes, and prefer to keep a record book of the plantings. This is all very well, but it is a great nuisance, when a handsome new one is in bloom, to have to refer to the book and count up the position in the row in order to find out what it is. So I make a planting diagram, to check up if a stake gets misplaced, but depend mainly on labelled stakes.

A very convenient style of label is an ordinary copper wire tree label of wood, $3\frac{1}{2}$ inches long and $\frac{5}{8}$ inch wide. It is large enough to receive any civilized name of a flower, unless the originator has named it after some personage, and insisted on including not only the title, Christian, and family names, but the middle name as well. Then we

are inclined to abbreviate it anyway. I usually enter the date of planting and date of flowering on the back of the label, too, for ready reference. This takes little extra time and gives a record of considerable value in planning future plantings. The tree label may be wired to a small and inconspicuous green-painted stake about a foot long. If the label is turned with the name uppermost, then it is easily read without bending down to it. These small labels are convenient for digging and storage, too, as the label can be kept with the bulbs during drying and in storage. Its small size makes it easy to manage. A nurseryman with Gladiolus bulbs as a side line taught me this method, by sending my order with each bulb marked by a tree label wired to it. I used his labels and found them so handy that I have adopted them for my entire collection.

The commercial growers usually prefer a large stake, an inch or more wide and a foot and a half or more tall, on which the name can be written in large letters. These are good for display purposes in public gardens, but may be too conspicuous for many people's tastes.

With the soil all ready, well tilled and fertilized, it is then high time to decide just how the bulbs are to be planted. I would advise one of two ways of doing this, each of them good, but each especially

suited to meet a particular need. Do we want to grow an abundant supply of midsummer cut flowers with a minimum of labour and trouble, or do we demand the finest flowers that ever grew, and expect to give them the care and attention requisite to that end? Either of these is an entirely commendable aim, and the Gladiolus fits easily into either scheme of things.

If we want a wealth of flowers with little care, then close and deep planting is the proper thing. For such deep planting, deep ploughing—at least eight or ten inches—is essential. Then space the rows two feet apart, for convenient culture with the garden cultivator. Trench out the rows six inches deep with a plough or spade, and lay the bulbs in the trench in two rows, four inches apart and spaced four inches from each other in the rows. In this way, six bulbs can be planted to each foot of row. Place each bulb right side up in the trench, with the old bulb scar down and the pointed end up. If, however, the bulbs are already sprouting, then it is best to set them with the little white sprout pointing up, whatever position of the bulb this may require. Planting the bulbs right side up is a bit troublesome, but it means less trouble in the end, for if the bulbs are strewn carelessly, the sprouts may come up at all angles and many will extend out into the middle of the rows where they

interfere with cultivation. When the bulbs are in position, then cover them carefully with about two inches of loose soil, taking precaution not to jostle the bulbs out of position while covering. Pack the earth down firmly around the bulbs. This helps to keep them moist so that they will sprout promptly, and likewise helps to insure the firm anchorage of the bulbs and roots in the soil. This firm anchorage will be important later, to support the flower stalks at blooming time. Then fill in and heap up the rows a little above the level with loose earth. After planting in this way, Gladiolus can be grown with little further care, but attention to cultivation at the proper times will save a lot of hand weeding.

About a week or ten days after planting the heaped-up earth over the rows may be raked down level. This will kill a lot of the sprouting weeds. Then, as the Gladiolus begin to break through the ground, about two or three weeks after planting, the soil may again be heaped up over the rows with the garden plough, thus smothering a second crop of weeds. Before the stalks of the Gladiolus are tall enough to be broken by the rake bar passing over them the earth can be raked down flat once more. By this time, most of the spring crop of weeds will have been discouraged, and flat culture, with moderately deep tillage, can be given between

The Superb Gladiolus (G. cardinalis) is one of the parents of the little star shaped "baby" gladiolus

Colville's Gladiolus, one of the oldest of the hybrid sorts, shows by its colouring its relationship to the Superb Gladiolus

The Parrot Gladiolus (G. psittacinus), a wild species from Natal, is a progenitor of all of the modern large-flowered garden gladiolus

The first Gandavensis, or Ghent Gladiolus, was the starting-point in the evolution of the present day sorts

the rows as needed or as time permits, until the plants begin to show young flower stalks. Then the earth may be hilled up strongly in the rows, to help support the tall flower stalks against the wind.

The close arrangement in double rows makes the plants help to support each other, and the deep planting insures good anchorage for the roots. So there is little danger of wind breaking down the flower stalks unless the situation of the planting is exposed to very strong winds. If there is serious danger of wind breakage, then the plants may be supported during the flowering time in one of the ways to be described later. But this will usually be unnecessary with this style of planting. Let us keep clearly in mind that such close and deep planting is for growing Gladiolus without trouble, and that it is not recommended to secure the very best flowers or growth of the plants.

For the very finest Gladiolus blooms—and some of the modern sorts are truly regal beauties when properly grown—a different method of culture is advisable. The handsomest of the new sorts are tall, heavy growers. They need plenty of room, a fertile soil, and an abundance of moisture and air around their roots to bring them to their best. For them the land may be furrowed out as for the first method of planting, but make the furrows shallower; four inches is about right, and even three

inches will not be objectionable on stiff clayey soils. Shallow planting allows more air to reach the roots than with deeper planting, and makes for healthier growth. But there is also more danger of the soil drying out around them, if there is a drought, and irrigation may be necessary during dry weather.

Wide spacing of the bulbs is also beneficial. The largest and tallest kinds will be benefited by spacing a foot apart in single rows. Some of the slender sorts can make their maximum growth with eight- or even six-inch spacing, in deep rich soils. We need to remember that the Gladiolus (unlike the fall-planted spring-blooming Tulips, Hyacinths, and Daffodils) makes its flower stalk from the food garnered during the current year. The food store in the bulb simply gives it a flying start toward that growth. So we must give the Gladiolus plenty of room if we are to expect the best returns from it.

Just after sprouting, the Gladiolus grows very fast. It is then drawing on the stored food in the bulbs to build up new leaves and roots. The growth is rapid, and there is need for both moisture and air. Frequent cultivation during this time is especially helpful. With shallow planting, the roots are formed near the surface of the soil, and deep cultivation might disturb them. So I do a great deal of my cultivation with a rake or a scuffle hoe, just stirring up the surface soil. This

will be advantageous after every rain, as soon as the surface begins to dry off. Keeping a loose dust mulch in this way not only conserves moisture and kills weeds, it also admits free penetration of air into the earth, and this is quite essential for the best growth of Gladiolus.

When the plants are six inches high and growing rapidly, then a first top dressing of fertilizer may be applied. This may be of bone meal and wood ashes, nitrate of soda, or a complete chemical fertilizer. The first application of fertilizer may well be a very light one, especially if nitrate of soda or other chemical fertilizers are used. Bone meal and wood ashes are mild and slow acting, so they may be supplied more liberally and less frequently. A half pound each of these latter may be applied to a hundred feet of row, scattering them along each side. Then one more similar application may be advantageously made just as the plants are about to flower. A quarter pound of chemical fertilizers per hundred feet of row is ample. Stimulating very rapid growth early in the season may even be harmful, making for weak and soft growth. About ten days later and every week thereafter until blooming time, this fertilization may be repeated, to keep the plants in steady and rapid growth.

With such high fertilization the plants must never lack water. Irrigate or sprinkle the rows

thoroughly whenever the soil becomes the least bit dry. Do not water too often, but do it thoroughly. The fertilizer, if chemicals are used, may be advantageously dissolved in water and sprinkled alongside the rows, to make sure that it will be immediately available to the plants.

Instead of either of the above treatments, poultry or stable manure may be steeped in its own volume of water for a week or longer, then the liquid drawn off, mixed with ten times its volume of water, and used for the weekly watering of the Gladiolus rows. These organic fertilizers, and likewise ground bone, sheep manure, tankage, and wood ashes are mild fertilizers; for this reason they are recommended in the hands of the inexperienced. Equally good results can be secured with chemical fertilizers—phosphates, muriate of potash, ammonias, and nitrates. But these are immediately soluble and it is easy to use them too strong, thus injuring the plants instead of benefiting them.

Gladiolus plants are usually quite free from troubles, as few of the usual garden pests attack them. But, as already mentioned in the discussion of the bulbs, there are diseases that attack them, and some of these may be recognized on the foliage of the growing plants as well as on the bulbs. Often, when an occasional plant is found dying or with spotted leaves, the trouble is ascribed to

drought or bad weather. It is much more apt to be due to one of the Gladiolus diseases, perhaps aggravated by poor growth conditions. So it will be well to recognize and to know how to deal with them if they appear.

Occasional plants may die down when about half grown. If these are then dug up, the roots and bulbs will usually be found rotted, and there may be small black flakes of fungus in the leaves at the ground level. These are the sclerotia of the dry rot disease. In this case, burn the affected plants, and treat the soil from which they were removed with a one fourth per cent. solution of either Semesan or Uspulun, to prevent the spread of the malady to neighbouring plants.

Sometimes during early growth you may find occasional plants with deep brown, diseased spots on the leaves. This is usually an indication of the hard rot disease, which attacks the leaves as well as the bulbs, and is especially severe on young plants, grown from bulblets or from seed. On valuable plants, I have sometimes controlled this by cutting off the diseased leaves, and treating the soil around them with the same preparation as recommended for dry rot Such treatment is not injurious to the growing plants—in fact, it is one of the few reliable disinfectants that can be used on growing crops without danger. But unless

the plants are especially prized, it is a better plan to pull them out altogether and burn them. If the diseased leaves are not disposed of, the brown spots enlarge to dead patches and in these small black specks appear. These black specks are the fruiting bodies of the fungus from which are discharged the minute spores that serve to spread the disease. So it is a good plan to deal promptly and severely with this disease whenever it appears.

The neck rot form of the scab disease may also break out among a few of the Gladiolus, especially during wet seasons. The first symptoms of this are the appearance of light brown streaks on the lower leaves near the ground, and sometimes the youngest developing leaf dies also. Later the leaves may rot off at the ground so that the stalk falls over. The same treatment is recommended for this as for the dry rot and hard rot diseases. Remove the diseased plants and burn them if possible.

Sometimes an occasional spike will fall over and wilt when about to bloom. Then usually a small puncture, with bits of chewed-up stem protruding from it, reveals the presence of a stalk borer—either the European corn borer or one of his relatives. Then the proper remedy is to cut off the spike at the puncture, follow down the tunnel of the enemy, seek him out and destroy him. Being a borer, sprays will not reach him.

If the Gladiolus are being grown for exhibition spikes, and are from large bulbs of the large-flowered varieties, planted widely spaced in single rows, then staking of the plants when they are ready to flower will be necessary, to prevent wind damage. This needs to be done as soon as the flower spikes appear. Bamboo canes, four feet long and painted green, make neat and inconspicuous supports. These are stuck into the ground a foot deep, one close beside each plant, and the stalks are tied loosely to the canes with raffia or light twine. Do not tie them tightly, as the flower stalk continues to lengthen until the flowers open, and it needs to be allowed to slide freely through the supporting strings.

A more economical but less ornamental support to the flowers may be provided by setting stout stakes in the row a rod apart. Then two strands of heavy twine can be stretched tightly between these, one strand on each side of the flower stalks, and at a height of about two feet. These strings are flexible enough to allow the spikes to sway a little in the wind and thus do not tend to snap the stalks off at the height of the twine. This might happen if the support were more rigid. The strings give enough support to prevent the spikes from snapping off at the bulb, which they are liable to do with such shallow planting if they are not sup-

ported. If some of the stalks show a tendency to fall down between the strings lengthwise of the row, then cross-strings may be tied, joining the two lateral cords on each side of the reclining spikes so as to hold them erect.

The cultural methods here described are recommended as dependable for the home garden. There are many other ways of growing Gladiolus, and most methods of culture will yield good flowers, for the plant is easily grown and adaptable. The commercial growers have systems of their own, adapted to operations on a large scale, but such operations are outside the scope of this discussion. The same general requirements of light, air, and moisture are, however, quite as essential to the success of the commercial grower as they are to the amateur.

It would be quite wrong to leave this subject of growing without some mention of timing the plantings. How nice it would be if we could plan our gardens to have them bloom on just the day we want them! For a wedding anniversary, a birthday, or some other festive occasion, we may want flowers of a special colour for decorations. If these demands come within its blooming season, Gladiolus can be more easily timed to bloom on a given day than can most flowers. The duration of bloom of a single variety of Gladiolus from a

(*Upper*) *Alma Gluck is a peach red, one of those delicate tones which give their greatest charm to the Prims.* (*Gage*)

(*Lower*) *Tiffany* (*Brown*) *is an achievement in Prims, having daintily formed white flowers of good substance*

(*Upper*) *Crown of Gold* (*Gladiolus Bill*) *is a large-flowered Prim, with many deep yellow flowers open at once on its slender spike.*

(*Lower*) *Captain Boynton, pale lavender with dark blotch, has an admirably bold, broad flower.*

single planting of large bulbs is about a week to ten days, and the uncontrollable variations in blooming time due to the weather from year to year are seldom more than a week. So if one plants one or two dozen or more bulbs of suitable varieties and plans the planting for bloom on a given day in July, August, or September, it is quite reasonable to count on a large proportion of the flower stalks for use on that day.

This presupposes a knowledge of the blooming dates of the different varieties, which depends in turn on the time of planting. Planted very early, most varieties will be slow in starting into growth, so that they may bloom only three or four days ahead of others planted in warm soil weeks later. Moreover, this speeding up with later planting is not uniform for all varieties. Some varieties, such as Thoth (Kunderd), grow exceptionally well if planted early in cool soil. Others, like Alice Tiplady, Golden Measure, and the species Primulinus, are very hesitant about starting growth in cold weather, and gain little by early planting in cold soil. If one plants an average variety the first of April, in the Northeastern States, this early planting will bloom only about twelve days earlier than a planting made May first. The growth during April will only be about half as advantageous in hastening bloom as that during May, and a

May first planting will be nearly twenty-five days earlier to bloom than a June first planting.

Most plantings are made after the trees begin to leaf out in the spring. Then the soil is warm and growth is prompt. Under these conditions, the length of time from planting to bloom ranges from about seventy days for the early varieties to one hundred and twenty days or more for the latest sorts.

The enumeration of the blooming dates of any considerable number of varieties is a task for a specialist on variety trials, and such information is compiled periodically by the various trial grounds, in Canada, and elsewhere. Such information would also be a valuable addition to the descriptions given in the tradesmen's catalogues, but is seldom included. It will perhaps suffice here to list a few of the well-known varieties, which may serve as pace-makers, by which we may gauge the earliness or lateness of other and newer varieties.

Among the early sorts, which bloom in about 70 days after planting, are the old reliable pink Halley, large flesh-pink Le Marechal Foch, dainty ruffled white Marie Kunderd, and dark-blotched pink Elizabeth Tabor. In very nearly the same class, but possibly a little later to bloom in most seasons, are cream-coloured Mary Pickford, yellow Roanoke, deep red Dominion, and Kirchoff's Violet.

Amid the large assortment of midseason varieties

which bloom in 70 to 90 days, the following may serve as examples: flesh-coloured America, dark blotched pink Mrs. Frank Pendleton, yellow Golden Measure, and salmon-pink Jack London.

Many of our very late varieties are among the older sorts. Modern efforts have been directed mainly toward early blooming kinds. Among the older sorts white Peace, red Princeps, and red War are late bloomers, as are likewise the more recent sorts: red-blotched pink Mrs. H. E. Bothin, pale lavender Mrs. F. C. Peters, giant pink W. H. Phipps, and light red Jumbo. Kunderd's lavender-pink Indian Summer is extremely late, often requiring 130 days from planting to bloom.

By choosing among the earliest, midseason, and latest sorts, one may easily have a blooming period of about two months, with a profusion of bloom practically filling the season between the Iris and the Dahlias. This can be done by early planting of a well-chosen assortment, without any more serious planning or careful calculation. For those who wish to plan more closely, there are the lists of blooming dates published by Chas. E. F. Gersdorff, of Washington, D. C.; and of the Canadian Gladiolus Society. We may confidently look for similar information from the American Gladiolus Society's trial grounds at Rochester, N. Y., also in the near future.

CHAPTER IV

THE FLOWERING SEASON

AFTER we have done our part in planting and early care of the flower garden, it is natural that we will want to rest from our labours to enjoy the blooming time. Our main aim in growing Gladiolus is usually to get an ample supply of cut flowers. In order to enjoy them to the fullest extent, we may do well to observe some precautions in cutting and handling the blossoms. Thoughtful care in arranging the flowers attractively and effectively also adds greatly to our enjoyment of them. We have all seen great masses of fine blooms crowded too closely into stiff, tight bunches in vases. In many instances half the number of flowers, arranged with care, would have given more pleasure. So perhaps a little comment on cutting, handling, and arrangement of the flowers will not be amiss.

How many times have you seen those regal, full-flowered spikes of Gladiolus, which you cut in response to the eager longing in the eyes of the visitor from the city, crushed with others into a tight bunch and ruined before they have even left your

garden? Cutting in the early morning, and when the first buds are opening, is the best time. Then, if neighbour's willing youngster offers to carry them and crushes them in a tight little fist, there are no wide-open blooms to bruise. How the children love the flowers, and how they squeeze them, and one has not the heart to chide! Cut the stems as long as you can and still leave the requisite four leaves on the plant for its proper nourishment.

Whether the flowers are for one's own use or to be carried a long distance, it is unwise to leave them out of water immediately after cutting. They will last better if allowed to stand in water in a cool cellar for a few hours after they come from the garden. They take up a lot of water and are the better prepared for a long journey or for the drier air of our living rooms.

Opinions differ about the best containers for shipping Gladiolus blooms. If only a single spike is to be sent, it can be drawn into a cylindrical mailing tube, stem end first. If the buds are just starting to open when the spike is drawn into the tube, it will carry perfectly and open its flowers promptly when taken out a day or two later.

Florists pack their flowers snugly into cardboard or light wooden boxes. A convenient box for the inexperienced packer is one four or four and a half feet long, two feet wide, and about eight inches

deep, made of wood or of strong cardboard. Line the box with waxed paper and lay the spikes face up on the bottom in a single layer. Lay a board cleat over the stems just below the blooms, and fasten it firmly at the sides. This will hold the stalks in place and prevent jostling of the open lower blooms. Cover this layer of blooms with waxed paper. Then wedge bolsters of tightly rolled paper over the ends of the spikes, and in the middle, above the board cleat, so that each stands about four inches above the bottom of the box. These are to serve a double purpose: to wedge the stalks firmly in place, and to support a second layer of blooms high enough so that they cannot crush the lower ones. On these bolsters, place a stiff corrugated cardboard, which just fits snugly into the box, as a foundation for a second layer of flowers. Then line this with waxed paper and pack it with a layer of flowers in the same manner as the lower layer. The cardboard middle division may rest on cleats fastened to the sides and ends of the box, instead of on the paper bolsters, thus doing away with the necessity for so much care in arranging the bolsters to just the proper height. When the second layer of blooms is properly in place, and covered with waxed paper, then the cover may be tied or nailed on, the box addressed and plainly marked "Cut Flowers—Perishable," and your part

is done. The number of spikes that may be packed in such a box depends entirely upon the size of the blooms and the forwardness of the flowers. The wider open the flowers, the fewer spikes can be packed in a box with safety.

If the flowers are being gathered to compete in an exhibition, too much care cannot be exercised in the cutting, handling, and packing. It is a good plan to take a pail of water with you to the garden, and put the spikes in it as they are cut. If a coarse wire netting is fastened over the top of the pail, the spikes may be thrust through this and kept from jostling one another. If this practice is followed, of putting each spike in water as it is cut, then there is no chance for air to enter the thirsty pores of the cut stems, and the flowers will keep fresh.

While the flower stalk is still attached to the plant, its vessels are carrying up water to supply the growing buds and stalk, and to replace evaporation. The water is thus being pulled up the stem by the demands from above. This pull is greatest during warm sunny days, and least at night and in the early morning. So it is best to cut the spikes in the early morning, when the stalks are most nearly full of water. If the stalk is put in water as soon as cut, it can then pull water into the cut ends of the vessels easier than it could draw from the

stem and roots, and so it promptly fills up with moisture and stores up a reserve. If, on the other hand, it is cut and left out of water for a time, air is drawn into these open vessels. The stem is partly filled with air and is dried out a bit. Now, drying shortens the life of any delicate flower, so it is a good plan to prevent this by putting the flowers immediately into water.

After the stalks and flowers have drunk their fill of water, and hardened, as the florists express it, then they can be taken out and packed dry in boxes for a considerable time without much injury. They are then filled with water, and in a box well lined with waxed paper they evaporate very little. When the flowers are unpacked then about half an inch of the end of the stalk should be cut off, in a slanting direction, so that when it stands upright in the vase, the cut end is open to receive water, not clamped down tightly against the bottom of the vase. The cutting of the ends of the stems may be profitably repeated daily as long as the flowers last. This prevents the ends of the cut vessels of the stem from getting clogged up and adds materially to the life of the flowers.

Any drying at all injures flowers. So some of the most careful shippers never leave the stalks out of water. They either wrap the cut stems in soaked cotton, which will provide amply for short journeys,

or pack them upright in special boxes fitted with small metal tubes, in which the ends of the stems may stand in water en route.

A suitable arrangement to accomplish this is to fit a large packing box with wire netting frames, which slide in a vertical position into grooves six inches apart at top and bottom of the box. The flower spikes may then be tied to these frames with soft twine fastened at the tip and at about the middle of the stalk below the flowers. The cut end of each stalk may be plunged into the metal tube of water, with a wad of cotton in the top to prevent the liquid from splashing out in transit.

Such boxes need to be labelled on top and near the top of each side: "This end up with care." Rope handles at the sides, at a convenient height for carrying, will further encourage careful handling by the expressmen.

The trained florist can successfully transport his flowers in much more compact containers than the ones described here and have them arrive in excellent condition. But for the inexperienced amateur, it is a good plan to have each spike held firmly away from its neighbour, and thus avoid all chance of jostling and bruising.

All of this may seem like much ado about a small matter of detail. But when one's best efforts have been centred all summer on producing the very

finest flowers, it is vexing, to say the least, to have them ruined by a short journey of a few hours. If they are carefully packed, and in just the right stage of growth when they are cut, they make a fine showing. If they are to be shown on the following day, nearly the maximum number of blooms should be open when they start for the show. Remember that the judges cannot make allowance for unopened buds or faded blooms. They must judge on what is there at the time—not how the flower may have looked yesterday or may look tomorrow. I well recall a truly wonderful seedling shown by a prominent exhibitor one year. When judged, it had only five blooms open wide, and a sixth just bursting. They were not of extreme size and were loose in appearance. The colour was admirable, but the judges passed it by as not outstanding. Two days later, that same flower had opened several more blooms, the old ones had held up remarkably, and the seedling was recognized as something truly fine. If that spike had been two days older when it was judged, it would have gotten proper recognition. Its competitors were at their best on the first day.

So always try to have your flowers at their best on the first day of the show, when they are to be judged. If they are to be shipped a long way and

are not to be shown until two or three days after they are packed, then they may be gathered when just opening and packed more tightly for shipping. If packed closely and well they continue to develop in transit, and when unpacked may unfold four or five or more blooms in an hour or two, sometimes making even handsomer blooms than those that open normally.

In fact, one can delay the opening of the lower blooms and produce a handsome show spike, sometimes, by tying the young spike, just before the young buds unfold, in a cylinder of smooth paper fitting snugly around the buds. This prevents the lower buds from unfolding while allowing the upper ones to elongate and get their full size. The wrapping needs to be done with some care, for if it is too tight, the buds and petals may be mussed. If it is removed the night before the show, all of the full-grown buds will then open at once!

Gladiolus blooms that are handled and packed carefully may be sent long distances with ease. Because of their long and broad, rather crisp petals, they do not stand rough handling as well as do less graceful but tougher flowers, such as Dahlias and Chrysanthemums. But it is a source of satisfaction to know that with reasonable attention and care we can grow and exhibit as fine Gladiolus

blooms as the next fellow, and that we can likewise send the blooms to distant friends, even three or four days' journey away.

DECORATIVE USES OF GLADIOLUS

The tremendous popularity of the Gladiolus and its general acceptance as one of the most satisfactory and successful of cut flowers for decorative purposes is largely due, without doubt, to the marvellous range of colours shown by its many varieties—from the blazing brilliance of the stronger coloured sorts, through the wonderful series of tints and blends of softer and lighter shades to purest white, and varying even there with a thousand individual pencillings, blotchings, and shadings. It furnishes material suitable to almost every need and occasion and harmony or contrast with practically any background. The upstanding character of the spikes commands attention, the exquisite beauty of the individual flowers invites interest and compels admiration.

With such material available it is only necessary to use judgment and taste together with a little ingenuity to solve almost any decorative problem, and we have the variety in the form and size of the flower and character of the spike, such as are shown by the Primulinus hybrids, to assist us still further. These last are especially useful in table

decoration where their graceful form and poise, and delicate tints and colours—the creams, yellows, apricots, and oranges—lend themselves so well in combination with the linen and glass and silver.

The exceptional lasting qualities of the Gladiolus stand us in good service for this work as the spikes will keep fresh for a remarkably long time, even without water. This makes possible many novel and effective groupings produced by arranging them on the cloth; and for this purpose small spikes of delicate Primulinus varieties or the tips of spikes are most suitable. Beautiful place bouquets may also be made by combining a few choice blooms with graceful small Ferns and fine flowered sprays, such as Gypsophila. It should also be borne in mind that where refinement and delicacy of colour are desired it is helpful to cut the blooms and open them indoors, out of the sun. By choosing varieties of light lavender or violet shades with interesting throat markings, decorations may be made that are very suggestive of Orchids.

By using the short ends and small spikes grown from young bulbs, beautiful effects may be made, adding a little foliage and a few delicate flower sprays. Small sprays of Larkspur can be used effectively with Gladiolus and later in the season the wild Asters are very suitable. The common blue Wood Aster (A. cordifolius) is one of the best

for this purpose on account of its light branching habit. Quite a variety of foliage may be used in combination with the Gladiolus. For an arrangement in baskets or vases, Mountain Laurel (Kalmia latifolia) is very good. Wild Cherry and some of the species of Cornus, Viburnum, Willow, Oak, and other bright green leaves are very useful in larger decorations for the foundation and background. In the arrangement of a few tall spikes, it is better to use long grasslike leaves. Their own foliage is generally the most satisfactory, but broad Grasses, Iris, and similar foliage will serve the purpose very well.

The short spikes and ends are very well adapted to making up wreaths and similar decorations such as garlands and festoons in which a variety of leaves may be used, avoiding the coarser and larger sorts. Fern leaves may be used to give variety and it is preferable to use the delicate types. The common hay-scented Fern (Dicksonia punctilobula) is very good and lasts better than other sorts. The Ferns with the larger fronds are more suitable for use as backgrounds, and among these the most satisfactory are the Evergreen Wood Ferns (of the genus Dryopteris), as they have better keeping qualities. The Gladiolus is especially well adapted for use in sprays in which most beautiful effects can be produced that will suggest in appearance the choicest

Orchids. In all floral work the Gladiolus can usually be used in place of Orchids, and if the proper varieties are chosen will equal in beauty any design made with the Orchids themselves.

In large displays of Gladiolus arranged for effect in flower shows, evergreens are usually used for a background. In the writer's opinion, soft-coloured drapery of uniform tones would be a more appropriate background for a cut flower display. Draperies can be selected that harmonize in colour with the flowers, or give the proper contrast. The background material should not have any conspicuous design to detract from the flowers. The pink and rose-coloured spikes can be shown to the best advantage with a soft dark green background, possibly a velvet. White and pale warm shades would show to the best advantage against a soft blue or blue-green. For dark shades use light backgrounds, from white to different tones of gray. Before selecting a background, hold the flower against it and observe which gives the most pleasing effect. Light scarlet or scarlet can be placed against a blue-green background, while red proper is best against light green or gray, and purple-reds against light yellow-green. It is desirable to have the background lean toward the complementary colour of the flower. By complementary colours is meant, in the theory of colour, pairs of contrast-

ing colours in which it is said these colours complement each other, which are, purple and green, red and bluish-green, orange and turquoise-blue, yellow and ultramarine, yellowish-green and violet. In flower arrangement the use of complementary colours in their full strength will give a rather harsh effect, so it is better to use one of the colours in a lighter or weaker tone and the brilliant colour in a smaller amount.

For dark places, as in a church, where light is subdued, the long white and light coloured spikes of Gladiolus can be used to greater advantage than most other flowers, the darker surroundings accentuating their brilliance and purity. For occasions where the flowers are only seen by artificial light, it is better to use warm shades or tints, such as red, orange, and yellow, in different gradations. The cool colours, leaning toward blue, are not so effective when viewed by artificial light. For decorations in large halls use the largest flowered type of Gladiolus, such as Pink Wonder, etc.

The Gladiolus is admirably adapted for decorating a room or hall for such festive purposes as parties, banquets, and weddings. For such occasions many like to use only one colour in the scheme of decoration, and this may be done effectively with the Gladiolus as its floriferous spikes give such an abundance of colour. This effect of using only

Lacinatus is the forerunner of a new ragged-petalled race, of use for fancy decorations. (*Kunderd*)

one colour in the decorations can be overdone, however, and become monotonous. A more pleasing monotone colour effect may be obtained by not absolutely adhering to one colour—that is, by having different variations and gradations of the same colour, and a close colour added to it in small measure. When a picture is entitled "A Symphony in Yellow" it does not necessarily mean that only yellow pigments are used in the painting of it. Doubtless quite a number of different pigments were used to give the prevailing effect of yellow. Similarly in a pink scheme of decoration with Gladiolus, there may be used all the different shades of pink, from light to dark, and from cool to warm, and with these deep rose-reds in smaller amounts to give accent. By adding green foliage in sufficient quantities the decoration could be called a symphony in pink and green. The same idea may be followed with the other colours, and if red is chosen, lean toward the warm shades, avoiding purple and red-violet. If a note of cool colour is desired, add pale violet or some other blue flower like Delphinium or Campanula. The Blue Lace Flower (Trachyinene or Didiscus coeruleus) is very good with the small Primulinus hybrids.

In flower decorations sometimes bold contrasting effects are desired. These may be obtained very well by the combinations of complementary colours

but it is better to use the harmonious combinations. Full-strength violet and bright yellow in equal proportions is somewhat harsh. We see this combination frequently used with Gladiolus such as Baron Hulot, the popular dark violet, combined with bright yellow varieties. A more pleasing effect would be secured by using fewer Baron Hulots and more yellow varieties of soft tones and light tints. Violet and scarlet are usually considered an unhappy colour combination. Add white to it and the appearance will be a little better but still somewhat bizarre. Violet of a medium tone, and different tints of rose to cool pink, with cream and pale yellow, will give a more pleasing result. The violet-red colour, usually called magenta, is generally avoided by decorators as the least desirable colour, although we find it frequently enough in nature among the wild flowers. It is difficult to combine it successfully with other colours, excepting green and white, so plenty of green foliage must be used. To make it more lively, cool pinks and cream can be added. A good effect can be produced in a flower arrangement in a basket or vase by having the lower part consist of green foliage with Gladiolus spikes of dark purple or red-purple graduated to lighter tones of the same colour and to white and cream. Delicate Grass plumes and Gypsophila may be added.

For this arrangement the following green material could be used: foliage of Kalmia, fronds of such Ferns as Dicksonia punctilobula and Dryopteris spinulosum, Gladiolus or Iris leaves, Witch-grass or Red-top, Gypsophila, and Gladiolus flowers in dark purple or purple-red, and lighter tones of same colour (i. e., Purple Glory, Dr. R. T. Jackson, Anna Eberius, Herada).

A vase entirely filled with pure-white Gladiolus gives a rather characterless result which may be avoided by the use of a cream, light yellow, and lavender to even it, if a light-coloured arrangement is wanted for a dark corner of the room. The following varieties could be used for such an arrangement: white: Albania, White Wonder; cream: Loveliness, Miss T. Rose; light yellow: Gold; pale lavender: Byron L. Smith, Mona Lisa, Mrs. F. C. Peters.

With bright pink and rose-coloured flowers have plenty of green foliage or use them against a background of green drapery. For combination with the cooler pinks or light violet use creamy white or light yellows. This will give a delicate harmonious effect, and could be obtained by the varieties America, Byron L. Smith, Louise, Capt. Boynton, Mrs. F. C. Peters, and Mona Lisa.

The Gladiolus, being very showy, may be used to a good advantage in decorating display windows.

Various forms of decorations may be used such as having them distributed in beautiful vases, artistically arranged to harmonize with the bases and surroundings, and if vases were one of the wares of the store it would also help to exhibit their beauty to the customer. Harmonious backgrounds of draperies would add greatly to the general effect. Another suggestion might be to have one large vase filled with Gladiolus (in one or two varieties) with a little foliage, placed right in the centre of the window, and have the surroundings subdued so as not to detract from the central effect. If there were several windows, or divisions, as in large stores, such an effect could be made in each. For store or window decorations it is wise to choose bright-coloured Gladiolus as they more easily attract attention. For pinks, Panama, Evelyn Kirtland, Mrs. William E. Clark, etc., are effective in large quantities. All the reds may be used, but probably a more pleasing result would be achieved by breaking up the mass of reds into various shades and tints, avoiding those containing blue or leaning toward purple. If purple-reds are chosen it is better to vary them with rose and cool pinks.

Some of the effectively blotched varieties are also very useful, preferably the pink and salmon-coloured blotched varieties such as Martha Washington and Peach Rose or Pink Lily. These seem

better in mass effect than the whites with a dark blotch. Henry C. Goehl, white flushed pink, is very effective in masses. These marked and blotched varieties are not popular with everyone, and some even go so far as to dislike them greatly, preferring the self colours without markings. This, however, is largely a matter of personal preference. The self or single-toned flowers may be the best varieties to choose for massing, but for close inspection a vase of a few spikes of varieties with handsome and effective markings has a fascination that is difficult to find in the monotony of self colours. Many of the recent varieties rival the Orchids in their interesting design and unique form and colour.

In the arrangement of flowers it is not advisable to compose with too much effort. One must work by feeling and not entirely by rule. Do not have the flower arrangement look too studied. However, it is not wise to ignore the principles of composition, for one can know how to avoid bad composition by adhering to a few rules. Artists to-day like a free and unrestrained movement. They dislike hard, straight lines in flower arrangement which tend to make flowers look stiff and unrealistic. Unfortunately there are many Gladiolus with such strong, straight spikes that they are unpopular with artists, who consider them too stiff. Therefore, in order

to please our artist friends and to be artistic ourselves, we should try not to use hard, straight lines when composing a flower arrangement. When you go to an art museum or exhibition, observe flower pieces to notice how drooping sprays are often introduced to break the straight lines of tall-stemmed flowers.

Since the introduction of the species Primulinus, beautiful hybrids have been introduced with more graceful stems than the existing varieties. These hybrids have made it easy to decorate more freely and naturally with the Gladiolus. In addition to a slender and wiry stem, the flowers are spaced more loosely on the spike, which gives a lighter effect than the heavy, compact spikes. A number of the Gladiolus varieties will, under certain weather conditions, form crooked spikes, which lend themselves nicely to breaking up the lines of the straight spikes, but one should avoid using too many of these curved spikes, or the flower effect will be weakened. Sometimes the varieties that are apt to form crooked spikes come only a little crooked and these are especially good to select to use with one or two crooked ones. It will give greater variation in the flow of lines.

A few spikes of Gladiolus in a vase with their own or similar elongated foliage are the most suitable for home decoration. Many spikes placed in

a large vase or basket are better for large halls or church decorations, where the object is to make a showy mass colour effect. The spikes should be placed irregularly in the vase and not all in one line at the same level. The taller spikes should be nearer the centre, not extending far out at the sides. The spikes or stems of flowers may cross each other but not in the middle or at right angles. Dissection of lines is often good composition. It will avoid the conventional fan shape of Gladiolus arrangements. The Japanese lay much stress on line composition, and their art of flower arrangement is considered by nearly all the artists as very great and artistic. To study it for floral arrangement is beneficial, as much may be learned from it in the way of natural and graceful artistic arrangement. The Japanese art of flower arrangement is to produce a natural effect with few flowers or sprays. It is not wise to copy this style slavishly, and even with artistic feeling it is somewhat conventional. It is better to develop your own individuality. In arranging Gladiolus for artistic effect, it is well to remember that you are dealing with harmonious colour combinations in fine proportions, graceful lines, etc., and one should feel these qualities instead of trying to work them out entirely by rule. It may be criticized by some as very inappropriate and not good art to combine widely unrelated plants

with Gladiolus, but here if good judgment is used and the effect is beautiful and artistic it does not matter in the least.

It does not always follow that straight lines are bad in flower arrangement. For a large room or hall, tall straight spikes of Gladiolus may be used for a formal, dignified effect in forming column-like decoration either side of an entrance, bay window, or any place where formal decoration is desired. At the base of the tall spikes long-leaved foliage is appropriate.

It is a mistake to use too large a vase or basket for Gladiolus, as it will not be good proportion. Full attention should be on the Gladiolus themselves and not on the vase. For this reason, avoid brightly coloured vases. Soft-coloured vases, preferably in pottery of light warm grays, cream white, dull green or blue, or any other subdued colour that is in harmony with the colour of the Gladiolus, may be used. Vases should be simple, undecorated, and beautiful in form with a firm base and fairly wide-spread top. The flowers keep better if the stems are not jammed. If glass vases are desired, they should be either clear or green. The Gladiolus spikes should be two to three times the height of the vase or even more in the case of Primulinus hybrids or where a low, wide vase is used. Short

ends make an effective display when placed in low vases. Gladiolus may be arranged naturally with their own foliage, as if growing in low Japanese bowls. Pretty Grasses and Sedges may be added, but the whole design should be that of a few spikes or plants, and the main group not placed directly in the centre. One of the best Grasses to use with the Primulinus hybrids is the common weed, Witch Grass or Tumble-weed (Panicum capillare). I allow a little of it to grow in my garden especially for this purpose.

In low receptacles, lead rings or metal flower holders or anything else that is suitable should be used to hold the plants in position. Even for taller vases different devices such as wooden sticks near the top of the vase may be used to hold the Gladiolus spikes in position. Poultry netting may be used near the top of wide-mouthed vases of large size. Hemlock boughs placed in the vase are sometimes used, but it is better to keep the water clear, as any foliage in the water will decay, making the water impure and preventing the flower from lasting any length of time. The stems of the Gladiolus should be cut on a slant to prevent them from resting entirely on the bottom. If the stem could be entirely raised from the bottom of the vase it would be still better.

To become expert in the art of flower arrangement one must develop an artistic feeling for natural beauty, to love it, and to observe and study good examples in composition, and through practice will soon be able to apply it successfully in making artistic arrangements with Gladiolus.

CHAPTER V

HYBRIDIZATION AND INHERITANCE

AFTER the house is well supplied with all of the blooms that are wanted, and we have likewise shared with our friends, then there may still be a surplus of fine blooms to tempt us to grow seed from them. What sort of descendants may we expect from seed of Golden Measure, or Giant Nymph, dainty little Golden Frills, or tall and stately W. H. Phipps? The only certainty is that they will be different from their parents. Nevertheless, there are enticing possibilities in seedlings of such plants as Gladiolus. If we wish to go just one step farther and enter the field of plant breeding, then there is a truly fascinating pastime open to us.

The desire to create new things—to introduce new elements of beauty into our houses, clothes, grounds, and gardens—is deeply rooted in human nature. To the lover of flowers there is a special pleasure in having the finest and in sharing them with friends. There is still greater joy in them when the flowers are of one's own rearing from seed, and may even be quite new and distinct from any

ever seen before. If the seedlings be of Gladiolus each may be kept and its bulbs increased from year to year, so the production of a fine new one has promise of lasting pleasure in it. It is accordingly more satisfying than the fine pansy or other annual, the seedlings from which are apt to disappoint you the following year.

How much more fascinating is the work of creating when one can consciously direct and control the processes of evolution—setting up an ideal flower in one's mind as a goal, with assurance that one may by taking thought make steady progress toward that aim! This is the true art of hybridization—using the known laws of heredity to produce newer and finer living things. Hybridization is easily accomplished with the Gladiolus, and the experiences of the writer, gained during a number of years' work with cross-breeding, will illustrate several of the principles governing heredity in this, his favourite flower.

Though the Gladiolus is an easy flower to cross-pollinate, being of good size with prominent pistil and large stamens, there are a number of details in the operation, proper attention to which will add greatly to the success and enjoyment of the work. First of all, select good healthy plants as parents and remove the anthers from each flower of the seed-bearing parent as soon as possible after each

one has opened—early in the morning when the flower is just opening is a good time. In removing the anthers care must be taken not to injure the pistil. Always handle the flower carefully.

For precise work it is wise to cover the spikes of both parents with cheesecloth or fine gauze, to prevent insects from robbing the pollen or bringing pollen from undesirable flowers to the stigma which would spoil the cross. There are quite a number of breeders working on the Gladiolus who do not believe in covering the flowers—or do not practise it. They claim it is of minor importance to protect the flowers from foreign pollen, as very little of it will reach the stigma, because the bees and other insects rarely touch the stigmas of the wide-open flowers. This can scarcely be so, as Gladiolus naturally set seed freely during the summer outdoors when the bees are flying, and not at all in the greenhouse or indoors unless they are hand pollinated. Then also it is contended that by putting an ample quantity of pollen on the stigma, other pollen added to it by insects will not have much effect; furthermore, that the pollen is heavy and does not scatter, and that it takes too much time to cover the flowers and so less work can be accomplished. This is all true to a certain extent, and some fine varieties have been produced without taking precautions.

Nevertheless, it is preferable to cover the flowers and to make fewer crosses. It is difficult to keep proper notes and records of them all and it is better to concentrate on some special character or quality to obtain from crosses that one can feel sure are pure without any possible interference from other pollen than that selected. In my experience, when flowers are not covered, the seedlings from wide-open flowers come predominatingly of the Primulinus form, which is not generally true of covered crosses. The Primulinus hybrids are very heavy yielders of pollen. Then, too, when the flowers are left uncovered there is often trouble to get enough pollen, while in covered flowers the anthers are filled with it. Small bees rob the Gladiolus pollen, especially early in the season. The greatest advantage from covered crosses is that the sure pedigree of parentage is very helpful in pointing the way to further work with them, and the record of the results will have more interest, being sure.

Paper bags may be used to cover the spikes, but I prefer cheesecloth, as in my experience healthier seed pods are obtained. I use a simple device to cover the flower spikes when hybridizing. A strong wire about five feet long is twisted into two loops about a foot apart and about six inches in diameter. The lower loop is made a little the wider and from this the wire projects downward about ten inches.

This projecting end is inserted into a hole bored perpendicularly into the top of a stake, which is pushed into the ground close to the flower spike, with the loops surrounding the flowers. Over this wire frame is placed a fine cheesecloth bag which is lightly sewed to the upper loop. This bag may be lifted from the stake when transferring pollen, and when replaced it is tied closely by a narrow tape fastened at the bottom.

In transferring the pollen one may use an artist's sable brush of a small flat size, and preferably one that is worn so that the hairs are short. This is a most practical implement, as it may easily be cleaned after each application of pollen by rubbing it over the back of the hand. The hairs being rigid and not so spreading as in poorer brushes enables one to remove an ample quantity of pollen from the anthers and place it very nicely on the stigma. It is important to apply ample pollen and at just the right time. When the three branches of the style, the stigmas, are spread wide apart and are feathery in appearance they are receptive for the pollen. Earlier, when the flower has just opened, the stigmas have an immature appearance, not being open and spreading. When the flower is nearing its end or wilting they are limp. In either of these cases, if pollen is applied, it will not be very effective.

The morning is the best time to hybridize, although crosses may be made successfully at any time of day, from six o'clock in the morning to late evening. Much depends on the weather. On warm, moist days one may hybridize quite early, while on a cool day it is better to hybridize later for best results. When the weather is very dry the plants do not set seed well. In this case it helps to give them a good watering, but avoid drenching the flower spikes. It is not only well to select good healthy plants for parents; likewise see that they are free from weeds, well cultivated, and nourished, but do not overfeed them. This all helps to produce good seed. Nitrates in excess will overstimulate the vegetative growth and the seed production will be small. Phosphorus is very good for seed production. It is best to cross only from four to six flowers on a plant and cut off the rest of the spike to allow all the strength of the plant to produce good seed pods. The stigma is receptive usually in only one flower on a spike each day, but in some varieties with full spikes two or even three may be pollinated the same day. A flower may also be pollinated a second time the same day or even on the following day if insufficient pollen was available the first time. Pollen from cut flowers may be used, but the fresher the pollen the

Mary O'Mine, white, is one of Mrs. Austin's sturdy sorts and has value for florists' use.

Gold (Hoeg) is regarded by many as one of the most generally satisfactory yellow gladiolus.

better; in fact, I think Gladiolus pollen is good for only a short time.

In hybridizing one generally starts with an aim to produce a novelty or a decided improvement over existing sorts, and so selects parents with the hope to gain the desired result. What selections to make and how to go about choosing them is largely a matter to be learned by experience, by making experimental crosses and keeping records of all of them. Have the spikes well covered to obtain pure crosses. All this helps to advance the art of hybridizing and to produce seedlings of superior merit. One cannot always expect to obtain the desired result from the first cross. Often the offspring must be crossed again with other varieties or inbred (self-fertilized). Sometimes the seedlings from a cross when crossed with each other give good results. Crossing back to one parent is also practised. Often hybrids are sterile to their own pollen, but will produce seed from pollen taken from other varieties or even from their own kin. Occasionally there are hybrids that are entirely sterile, while there are others that are perfectly self-fertilizing and produce seedlings as vigorous as their parents. From self-fertilized hybrids I have obtained seedlings where the stem and spike were taller than the original parents.

Thus inbreeding does not always weaken the offspring.

The modern horticultural varieties of Gladiolus are derived from many different species, and the individual characters of a variety are apt to lean more or less toward a particular species, though the peculiarities of many species may be latent in its makeup, ready to reappear at any time in its seedlings. For this reason we find much variation in Gladiolus hybrids. One must often use selection in combination with hybridization. Select among the hybrid seedlings the ones that come nearest to your ideal, then cross them again with others that come still closer to the ideal. Step by step the final result will be obtained, achieving a novelty that could not have simply happened. The Ruffled Gladiolus most probably were originated by Mr. Kunderd through this method. In hybridizing or crossing the Gladiolus it is impossible to foretell with certainty how the offspring will appear; but one who has made a close study of the subject may by scrutinizing the results of past experience predict his result to a certain degree. So in my opinion plant breeding is by no means a gamble, but rather a scientific study in which the percentage of satisfactory results is in more or less exact proportion to the amount of care and intelligent thought invested.

The general experience of the writer in crossing the Gladiolus is that like produces like and the union of unlike parents produces intermediate offspring, with so-called blended inheritance. The exceptions have been that some of the characters have not appeared in the first generation, but have reappeared again among a few of the offspring in the second generation. This alternate inheritance is less common. In general, not only is there a blending of the characters of the parents in their offspring, but the proportion of the seedlings showing any character is apt to be dependent on the proportion of the more remote ancestors which had that trait. Thus in breeding for a colour, such as yellow or white, one gets yellows or whites about in proportion as there are many or few yellow or white kinds among the ancestors of the varieties that are crossed.

The following are some of my records in colour inheritance; these will serve to illustrate how it works in actual practice.

For instance, I have been working to obtain a large-flowered Gladiolus of as pure deep yellow colour as the species Gladiolus primulinus. Primulinus hybrids rarely or never come as deep yellow as the wild type in the first generation. This is even true if yellow varieties are crossed with Primulinus species. They come light yellow,

bronze, orange, and salmon, the yellow colour being always present, but masked or diluted by the colour inheritance from the parent variety. Primulinus species crossed with red varieties give offspring of orange, scarlet, red, and salmon. Only in the second generation are we liable to get any pure deep yellows, and then only one or two, though most of the seedlings have some yellow tint in them. By crossing a Primulinus hybrid of orange salmon colour with yellow blotch, back on the species, I succeeded in obtaining a few that were as deep in colour and a little larger than the Primulinus species. One of these received the name of Prim Queen. This was crossed again with my seedling Gold Elsie, a yellow hybrid derived from light yellow Primadonna, which is half Primulinus, and a yellow seedling obtained from a cross between Mme. Maunet Sully, creamy white with red blotch, and Primulinus Major, a yellow half Primulinus. Gold Elsie is thus three eighths Primulinus, with a large proportion of yellow and cream-coloured varieties in its pedigree, and the result of its cross with Prim Queen was about five hundred bulbs, only six of which produced flowers of a lighter shade than Primulinus species. All the rest came as deep yellow as the species without any other markings. Thus when the proportion of yellow in the inheritance was increased by continu-

ous breeding for yellow colour, it finally became the only colour in the offspring.

Rose Mist, a light red half Primulinus hybrid, crossed with Elvira, a creamy white half Primulinus hybrid, produced seedlings of different shades of colour. The majority came light red, next in number were salmon, a few scarlet, a very few bright red, also there were a few of paler shades of cream and rose. One was light yellow and one pure white. Thus the red tints predominated, as they usually do in crosses among Gladiolus.

A pure-white variety crossed with a salmon-pink Primulinus hybrid produced some fine white and pink Primulinus hybrids. Whites containing a red streak or blotch in the throat when crossed with each other produced mostly rose, light red, or pink offspring. Nearly all were striated and none came pure white or like either parent. In general, white varieties are apt to give darker or striated seedlings if they have any streak or blotch in them. Pure whites crossed together gave predominatingly pure white, but there were also some pink among the offspring.

Seedling No. 204, a light yellow Gandavensis with a red streak in the throat, crossed with pure-white Europa, gave me a fine lot of whites and creams and a few pale yellows. Most of them showed the red streak very faintly. A very

few came white with a red blotch and red streak. No. 204 is tall with a long, many-flowered spike, and most of the offspring were similar to it. The flower of No. 204 is slightly smaller than Europa, but a number of the seedlings had a larger flower than either parent. Mrs. H. W. Wheeler is one of the larger flowered seedlings from this cross.

Hybridizing often causes a character to come augmented or intensified in the seedlings. This is particularly true of red and purple colours in Gladiolus. For instance, if you wish to breed some fine pinks, it is better to select parents that are delicately blushed pink or show only a trace of pink or red, avoiding strongly red parents. Either cross such light pink parents together or one of them with a pure white to get the results mentioned above. A light red or dark pink crossed with a pure white will often produce good pinks, but in this case the result is caused by either one or both of the parents of the red variety being pure white.

Purple or dark violet crossed with white will give us mostly red, rose, and variegated flowers, rarely purple and no dark violet. By inbreeding or self-fertilizing the offspring some nice bluish-violet shades may be obtained, but even these are of rare occurrence. Violet crossed with red usually produces red and variegated red, but rarely violet, and occasionally smoky colours, by which I mean violet

and red, not clear and not well blended. Thus the violet tint seems to be recessive.

Red crossed with a yellow with no Primulinus strain in it rarely gives yellow or orange seedlings but mostly red.

Seedling No. 595, a light salmon large-flowered hybrid having good substance in the flowers but of smaller size than Pink Wonder, was crossed with Pink Wonder with the result of a good number of large-flowered seedlings, two of them even larger than Pink Wonder. The substance of the majority of the flowers was like Pink Wonder, with rather thin petals, but a few came of better substance, nearer to No. 595. In colour they ranged from light red to white. There was one cream, a few streaky scarlet and salmon, and three had a blotch inherited from No. 595. Seedling No. 595 was also crossed with Golden Measure, from which cross a good ruffled seedling appeared. Neither of the parents is ruffled nor can I trace a previous ancestor that was ruffled. In my opinion it came from Golden Measure, having qualities of a strong growing Gandavensis type which occasionally show a little ruffling. No. 595 also had some of the strain of the strong Kelway Gandavensis varieties, and might thus carry a ruffling tendency.

According to the modern interpretation of Mendel's Law the separate heritable characters

behave as independent units. This may be so in a measure with other flowers, but in my experience I find it to be only partially true of the Gladiolus. To find a true unit character upon which one can depend in breeding work it is usually necessary first to self-fertilize the plant and see which characters come pure in the offspring; then one may accurately follow Mendel's Law. All this takes much time, and for practical purposes one is more apt to start work immediately with the most promising material at hand. From long experience in breeding plants it is possible to a certain degree to foretell the behaviour of characters in breeding. Colour is very complex, as you may find a colour dominant in one case and then not find it so in another variety. This is probably due to the fact that Gladiolus hybrids are derived from quite a number of different species, which causes difficulty in predicting or interpreting the behaviour of their characters in breeding.

So much has been written on the subject of Mendel's Law by prominent authors, confirming his conclusions and extending them to other forms of life, that a brief review of his studies will suffice here for those readers who may not have found opportunity to familiarize themselves with the subject.

This explanation of inheritance was first advanced by Gregor Mendel, an Austrian priest, in

The Purple-spotted Gladiolus (G. purpureo-auratus) gave rise to the Lemoinei race, with dark throat blotches

A Fischer seedling which shows the characteristic yellow-bordered maroon throat blotches of the Lemoinei race

The Saunders Gladiolus (G. Saundersii) is the parent of our really large-flowered Gladiolus. It gave rise to both the Childs and Nancy strains

Captain Braulot, a Nancy variety from Lemoine, clearly shows its Saunders Gladiolus parentage, both in its colour and form

1865, and is generally called Mendelism, or Mendel's Law.

The result of his experiments, conducted mainly with garden Peas but since found to hold practically true in many different forms of vegetable and animal life, were, concisely, as follows: If two parents of strongly contrasted characters, in each of which those characters are so well established that they will breed true (say, for example, rough and smooth seed, tall and dwarf, or light and dark), be crossed, the offspring of the first generation will show the character of one parent only; but when these hybrids are self-fertilized, in their offspring the characters of both original parents reappear.

That character which appeared in the first generation is called "dominant," and that which was lost in the first generation to reappear in the second, is the "recessive" character. In the self-fertilized offspring of the first hybrid generation the recessive character will reappear in about one fourth of the total number, and these recessives will breed true in all succeeding generations; the remaining three fourths will show the dominant character, and of these one fourth will be dominant in pure form, that is, will breed true. The remaining half that also shows the dominant character are internally hybrid, and their progeny will split in the same way

as that of the previous generation; that is, as the progeny of the first generation when self-fertilized.

The following account will illustrate how Mendel's Law applies to the breeding of Gladiolus. In 1907, there were very few good large whites with broad segments. So I selected Princeps, which was then considered a fine large red, and crossed it with a white from Cowee's World Fair Mixture, which later proved to be Snowbank (syn. Princess Sanderson), a white with good substance in the flowers and having about six to eight blooms open at a time. The offspring all came red, but of a lighter tone and not as bright as Princeps.

One of these was self-fertilized, with the result that two of the seedlings were large white ones, the others were different shades of red.

Thus the large size of Princeps and its red colour were dominant, the white and smaller size of Snowbank were recessive.

This law of inheritance may be followed for practical purposes in recombinations of characters which are known to breed true; but in my experience it does not always work out as expected in Gladiolus. Most of them are of such mixed ancestry that they do not breed true if self-pollinated, and would not be expected to follow Mendel's Law with any exactness when crossed.

The wild species of Gladiolus are more nearly

pure bred and give much more uniform results when crossed. For instance, when two wild species, Gladiolus primulinus and G. saundersii, were crossed, the progeny were practically all salmon tinted, with the long petals and flower form of saundersii. Thus the yellow colour of primulinus and the red of saundersii were both dominant over absence of these colours, blending in the seedlings to the salmon shades. Likewise, the long, recurved, narrow petals of saundersii were dominant over the rounder, shorter petals of primulinus; and all had the saundersii spotted throat, though less pronounced than in the species.

One of these seedlings was crossed with a pink with light throat, and these seedlings of the second generation again had the saundersii form of flower, with spreading, recurving petals, and were prevailingly salmon in colour, a few being pink and some nearly scarlet.

In the first generation from the cross of the two species, saundersii was dominant in all except the body colour, which was modified from red to salmon by the presence of the yellow colour from primulinus. In the second generation there was some segregation of colour, into the scarlet of saundersii and pink of the variety parent; most of these seedlings were again salmon coloured, but none pure yellow.

In using species for crossing as in this case, one is apt to find many of the characters of one of the species to be dominant in the seedlings, and it usually requires two or more generations of breeding to get away from the undesirable characters which practically all species possess. It is desirable to use wild species of Gladiolus for hybridizing only in order to introduce some highly desirable character not already found in the cultivated sorts. For instance, G. primulinus has been useful in developing pure deep yellows, and a blue species might likewise be useful in working toward blue varieties.

It is sometimes difficult to combine certain desired characters, such as large size of flowers and deep yellow colour. Apparently suitable sorts may be crossed, but the desired new types may not appear among the seedlings. In such cases it is wise to sow a large amount of self-fertilized seed from which to grow a large family of the second generation. There may then be enough seedlings to give a chance for the appearance of the combination of the desired characters, and also the possibility of the appearance of other rarer combinations.

Often hybrids will not self-fertilize. In that case it is best to cross the progeny of the first cross with each other, and if they will cross one may then get the recombinations. In this way I bred a beautiful large violet from a small violet, but it

did not prove satisfactory as it had some faults. There are so many factors that are important in the breeding of the Gladiolus that it is a serious task to produce a superior variety. Generally only a part of the seed sown will germinate, and a number of the young plants die before maturing. It is possible and even probable that the seeds that do not grow or seedlings that do not survive may include many that carry the latent or recessive characters. So it is always uncertain whether we can surely get the combinations that we wish from even the most promising cross. But this very uncertainty makes the work the more entertaining.

CHAPTER VI

PROPAGATION

A GOOD collection of Gladiolus, if well cared for, may be kept up quite well for a considerable time by the natural replacement of each old bulb by the new one which grows out of it each year, and by the occasional divisions of the bulbs into two or three from one. The rapid increase of Gladiolus stocks by bulblets is a separate art, requiring some special skill and technique to be successful. So it is scarcely worth while for the average amateur to bother with it. Like the propagation of hedge plants and flowering shrubs, and other nursery operations, it may be quite easy, but is a nuisance in the flower garden unless one has some special incentive for doing it.

But if crosses have been made, and the seed pods are filling with promising seed, then care of seed, rearing of seedlings, and increasing the stocks of interesting seedlings all become matters of real concern. So the following suggestions are made to assist the beginner in plant breeding to pursue his investigations to successful accomplishment. Many of the recommendations may seem entirely im-

practical to the commercial grower, whose aim is to produce saleable stocks of established varieties in quantity. Many practices are allowable, however, in dealing with small quantities of hand-pollinated seed or pedigreed seedlings which would be quite impractical for the wholesale grower.

Our first care is the harvesting and storage of the seed. Each successfully fertilized flower will produce an elongated, three-sided pod which, when it ripens and turns from green to straw colour, will begin to split open lengthwise. Then it is time to gather the seed, before the wind can scatter it. The whole spike may then be cut off and put into a bag to dry. The pods at the top of the spike will often be three or four days later in ripening than the lowest ones. Do not attempt to separate the seed from the pods until they are thoroughly dry. The seed may still be quite green when the pods first begin to split open. Seed and pods may even be left together in the bags until planting time without harm.

When the seeds are separated from the pods, each is seen to be a broad brown wing, with a plump kernel about the size of a radish seed in its centre. Some of the wild species of Gladiolus have wingless, globose seeds, but all of the garden hybrids have winged ones. No special precautions are necessary in keeping the seed, except that they keep best

when dry and cool. Even freezing does not seem to harm the dry seed.

The proper time to sow the seed depends on the facilities available for handling the seedlings, and on the degree of impatience of the grower. If a greenhouse is available, then the seeds may be planted in the autumn, even a month after ripening, and grown all winter. When they are grown in this way, a year can often be saved in bringing the seedlings into bloom.

Seed flats five inches deep filled with sandy loam are convenient for indoor sowing of Gladiolus seed. In these the seed may be sown thickly, one half inch deep in drills an inch or two apart. Seedlings started in this way in the autumn will usually die down in March or April if they have been grown all winter in a cool greenhouse, and will yield bulbs from about the size of small peas to that of kidney beans. These winter-grown seedlings may be a little slower in starting than ones that have rested normally all winter, but several of them may be expected to bloom the same season, just a year from the ripening of the seed.

Time may also be gained by sowing the seed in deep boxes, which may be placed in a sunny window or a greenhouse in February and later moved outside to a sunny location, or the seed may be started in a coldframe. In growing large quanti-

(Left) Coronado (Briggs), a ruffled milky white with feathery purple throat.
(Right) Vaughan's White is a tall growing sort of imposing habit.

ties of seedlings it is more practical to sow the seed directly outdoors in prepared beds, about four or five feet wide. Sow in drills one half inch deep and in rows a foot apart. It is advisable to prepare a good soil enriched with sufficient humus. The soil should be of such a nature that it holds moisture, as the seed should never be allowed to dry out. However, the beds should not be so low that the soil will become water-logged, inviting disease, which is so often disastrous to seed beds. Have the surrounding paths lower by about two to three inches so the water will drain off from the small seedlings in heavy showers. If the beds drain properly it is profitable to water them well during the growing season. This helps to make large seedling bulbs the first year, which means that a large percentage of them will bloom the following year. Generally one half to two thirds of the seedling bulbs will bloom the following year, but this percentage depends on how the seed was obtained, and varies considerably with the different varieties. It depends on whether the seed was obtained from crosses, self-pollinated, or gathered from pods that grew from natural pollination. Certain crosses of quick-growing strains have a small percentage of bulbs come into bloom the same year the seed is sown.

To keep the seed beds moist it is well to shade

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To keep the seed beds moist it is well to shade

them. This may be done in different ways, either by lath screens or by mulching with grass or peat moss. One of the best methods of shading the seed bed is by nailing a coarse burlap on frames to fit over the bed, fixing it about a foot above the seedlings.

In fertilizing the ground it is wise not to use strong, fresh manure. An equal mixture of dry pulverized sheep manure, hard wood ashes, and bone meal is generally found very beneficial if not used too strong. It is a bit difficult to advise just how much to use, as this will vary greatly with the soil. In general, a pail full of a mixture of these in equal proportions, applied to one hundred square feet is about right, and this can be raked into the soil before sowing the seed.

The bed needs to receive the best attention all the time to give the seedlings a chance to produce a fine crop of little bulbs in the fall. These should average one fourth to one inch in diameter. The bed must be frequently cultivated to destroy weeds, being careful not to work the soil so deeply as to destroy the roots of the bulbs. The seed will germinate in from twenty to thirty days. When they are sprouted and the seedlings are about two inches high they should be uncovered to get the full benefit of the sunlight. This makes stronger

plants than if they are kept shaded. As soon as the seedlings are well established a light top dressing of sheep manure may be used, being careful not to get it too near the seedlings as it is liable to burn the tender green leaves. Avoid getting the seed bed infected with disease-causing fungous spores, by using new ground each year, where there is no possibility of diseased old foliage of Gladiolus being left from the previous season.

After the first season's growth, the seedlings may be handled about as recommended for the old bulbs, except that the smaller ones, less than three quarters of an inch in diameter, should be planted shallow, not more than two, or at most three, inches deep.

Seedlings from good varieties are apt to produce some very good flowers. The smaller bulbs will produce small, few-flowered spikes, and these are apt to make better flowers the second year of blooming than the first. On the other hand, a young seedling bulb possesses much vitality, and may produce a finer flower spike in its first year than it ever will again. There is so much difference in the reliability of seedlings and in their performance from year to year, that it usually takes two or three seasons of bloom to decide finally the merits of the promising new ones. It is a good

plan to discard the obviously unfit during the first year, and make more rigid selections in the second season of bloom.

If we are fortunate enough to secure some really handsome and superior seedlings, then our next concern is to increase our stock of them. The usual way to do this is by growing the wee bulblets that cluster around the base of the new bulb at digging time. The care of these is quite different from that of the old bulbs, as they should never be dried out fully nor kept dry. The bulblets grow best if they have never been allowed to dry at all, except on the surface. They should also be stored even cooler than bulbs. The best place to keep them is in a cellar without artificial heat, where it is cool and not too dry. A temperature of 35° to 50° F. is about right. They may be kept in wooden boxes or trays with the soil that comes with the bulbs. This soil is generally satisfactory, as it gradually gets dry, but not too dry nor too moist, if the boxes are kept on the floor of the cellar and away from standing water. If there is too little soil from the cleaning of the old bulbs to cover up the bulblets, then sand may be added. If they should get too moist mould is liable to appear, also they are apt to sprout too early. About two weeks before planting time they may be watered moderately where stored. This will help to make them

sprout more easily when planted. Many growers soak them in water for a day or two before planting.

It is best to plant bulblets very early in the spring as soon as the ground and weather will permit, in-order to gain the longest possible growing season. Most growers plant bulblets before they plant bulbs. The dampness of the ground in the early spring is a great help and in most cases a necessary condition in order to soften the hard shells of the bulblets. They may be planted in shallow drills like peas, about two inches deep and in rows about two and a half feet apart or less. The bulblets should be sown thickly, 100 to 200 per foot, as not all will sprout. It is easier to weed them if the drills are made not more than three inches wide. With some varieties, like the Primulinus hybrids which have thin-shelled bulblets that grow easily and quickly, it is better not to sow so thickly. When covering the drills, firm the soil with the hoe or foot to pack it around the bulblets and keep them from drying out. If the season is dry the bulblet beds need to be watered. If they are not grown in large quantities they may be covered with a mulch of peat moss or some similar material to keep the soil from drying out.

In the Northern States bulblets are usually planted in April, in California they may be planted

in January, and in Florida at almost any time, preferably in September. Bulblets that have an especially hard shell and are therefore poor germinators may also be planted in the fall in the Northern States. In this case it is better to sow them in drills a little deeper than when planted in the spring and cover them well with some protecting material during the winter. This may be removed when the danger from hard frost is past and it is time for the bulbs to begin to grow. If the sort is a particularly choice one, the bulblets may be planted in a cold-frame with a covering in order to avoid the risk of freezing. This method, of course, has the advantage of an earlier start, as the soil in the frame will be warmed by the sun. Hard-shelled bulblets can stand quite severe freezing when in the ground, judging by the fact that bulblets of the variety Mrs. F. C. Peters that were accidentally left in the ground over the winter came up better than the ones planted in the spring. This has been observed among other varieties and by many Gladiolus growers. It is the chief cause of a stock becoming impure and containing other varieties called rogues. These get mixed in the stock because of the bulblets left in the ground from the previous year. Therefore, if anyone has enough room it is advisable to plant the Gladiolus in a different place each year, or plant only large-sized bulbs, and if

small leaves from bulblets appear, weed them out.

Particularly valued hard-shelled bulblets should be peeled by hand or cracked by squeezing them between the fingers, and spaced carefully in rows two feet apart. Peeled bulblets should be planted late in the season when the soil has become warm. Some time in May, but not earlier, is about right in the Northern States. Use judgment according to location and season. To get an early start they may be planted in large-size pots in a greenhouse and later be transplanted outside where they get the sun all day.

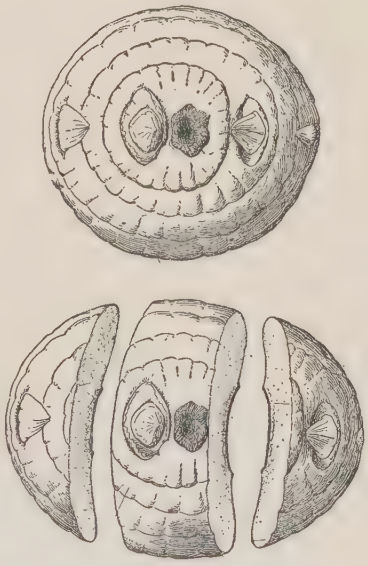

Fig. 3. Top view of a Gladiolus bulb with its husks or scales removed, showing the way in which it may be divided.

The young bulbs grown from bulblets may be dug or lifted earlier than the large bulbs. September is not too early, even if the foliage is still green; they can be handled much better in that condition. Small choice lots may be left in the ground longer provided they are carefully watched so as not to de-

lay too long and risk their becoming diseased in the cold damp ground.

Some interesting and promising new kinds may produce few bulblets or none. Then what can we do about it? We may then resort to dividing or cutting the old bulbs. The husks are removed and the bulbs are divided with a knife so that each piece contains at least one eye and some root surface of the old bulb scar at the base. This is done just before planting and the cut surfaces are dipped in powdered sulphur as an antiseptic to prevent decay. With these also it is well not to plant too early as the bulbs, unprotected by their outer coats and with their wounded surfaces, are apt to decay in cold, wet soil. It is sometimes possible to get a number of bulbs from one bulb without dividing it, but these are more crowded and do not produce such nice round-shaped bulbs. In most cases you do not get such a fine number of healthy young bulbs by division as by bulblets, so this dividing is advisable only in extreme cases.

CHAPTER VII

AUTUMN AND WINTER CARE

LET us now devote a little attention to the late part of the season. The flowering time is over. The last stately stalks of Gladiolus have been garnered. Dahlias, Cosmos, and Chrysanthemums are coming into their full glory with the first crisp days of autumn. The Gladiolus garden, having carried the main burden of the midsummer flower supply, looks ragged and sere, and so is apt to be neglected as of no further consequence. But it holds still the promise of next year's flowers, and still needs a little care.

If the flower stalks were cut properly, letting four or five leaves remain on each plant, then the new bulb is building up rapidly during these last days of the season. Any flower stalks left on the plants for ornament and not intended for seed should also be cut, to throw all of the strength of the plant into the growth of the bulbs. Keep the soil loose around them, and an occasional watering, if the season is dry, will mean much toward next season's flowers. This late-season growth is important. Compare the harvest of new bulbs from

late plantings, which flowered just before freezing weather, with those from earlier ones. The bulbs from the late planting are seldom as large as the ones planted in the spring, and frequently show no increase, while the month or two of growth after flowering has swelled the yield of the rest of the crop to two or three fold, the increase being both in larger bulbs and greater numbers. This emphasizes the value of the growth after flowering, and it may be profitably prolonged as late in the season as active growth continues.

As soon as the leaves begin to turn yellow and become dry, and the large fleshy storage roots have begun to shrivel up, then it is digging time. The Gladiolus, like all bulbous plants, has a cycle of growth and of rest each year. The length of the growing period is not the same for all sorts. Some, like Prince of Wales, may die down in midsummer, while others will grow late into the fall, even if planted very early. When the tops of any variety begin to die down, it is well to dig that variety, for Gladiolus bulbs do not favour wet feet during their rest, and leaving them in the moist soil long in a resting condition is simply courting danger of decay.

The bulbs from some of the earliest plantings of early sorts may be ready to dig by the last of August. The main bulb harvest will be ready the last

of September or early in October. If the press of late autumn work or the prospect of bad weather late in the fall makes early digging preferable to late, then the bulbs may be dug thirty to fifty days after blooming. This will give sufficient time to develop blooming bulbs for the next season, but will not usually give the maximum growth of the new bulbs.

The digging need not be a burdensome task. It is most easily done when the soil is just dry enough to be loose and soft. If it is too dry it will be hard and caked, and if too wet it may be sticky or muddy. Of course, a light or sandy soil is easier to manage in all sorts of weather than is a clayey one. A good way to get the bulbs out of the ground is to first break up the soil in the row by digging down and loosening it a little from each side. Then the bulbs can usually be lifted by the leaves and pulled through the broken ground without having the bulbs or bulblets drop off. If the earth is hard or the leaves are too dry and brittle, the bulbs may not pull up readily, then they will have to be dug out separately—a rather tedious job. For this reason it is best to start the digging when the tops are still somewhat green.

It is likewise essential to dig them early enough in the fall so that the bulbs will not be frozen in the ground. Most Gladiolus bulbs are tender,

and will be killed by freezing. If very wet weather interferes with digging in the fall, it may prove advisable to dig the earth out of the rows, bulbs and all, put it in boxes, and allow it to dry a little under a shed before attempting to separate bulbs and earth.

As soon as the bulbs are separated from the earth, it is well to cut off the tops close to the bulbs immediately with a pair of garden shears or scissors. Shears are less apt to tear or bruise the bulbs than a knife. Never tear off the tops of large bulbs, or attempt to twist them off, as this will tear the bulb scales and injure the bulbs. After they are topped, spread the bulbs to dry for a few days in the open before storing. If the digging is done early in the season, when the sun is still hot, then there may be danger of sun scald if they are left to dry in the direct sunlight. So it is then better to spread them in the shade. In the cool weather of late autumn it is beneficial to cure them for two or three days to a week in the direct sunlight. They may be spread on sacking or in shallow boxes, in which the bulbs should not be more than one or two layers deep. It is well to put them under cover on damp days and at night, to avoid a wetting or a possible freeze.

I often dig my bulbs very late in the fall, and

immediately take them to the dry garret of the house, where they are spread out to dry for ten days or two weeks before transferring them to their permanent winter quarters in the cellar. The field label is lifted and stored with each lot, as a precaution against getting the varieties confused.

However the drying is done, it is best to cure them for at least two weeks in some dry place before storing them permanently in the cellar. If they go into winter quarters before they are thoroughly dry, they are liable to mould.

If the bulblets of any of the varieties are valued, they should be separated from the old bulbs before the latter are dry. Two or three days' drying is ample for the bulblets. Then they should be immediately stored in earth. The earth that has clung to the old bulbs at digging and which separates with the bulblets is usually quite satisfactory for this. Keep the bulblets in a moister place during winter than the bulbs, and never let them dry out. Their hard shells can easily be dried too much and prevent sprouting. The handling of bulblets is a special task of itself, and scarcely worth while for the average gardener growing Gladiolus solely for flowers. It is much simpler to replenish with new stocks from the dealers oc-

casionally. But if one is raising seedlings and wishes to propagate them, then it is desirable to save and grow the bulblets from them.

After the bulbs have been dried for ten days or so, the old dead shrivelled bulb usually loosens its grip on the base of the new one and separates easily. At this time a cork layer is forming to make a dividing cushion between the two. This is nature's way of isolating the dead bulb from the living one, and preventing the spread of decay from the one to the other. We can further assist this by breaking off the old bulb and dried roots, which are of no further use. This cleaning is not only good housekeeping, reducing the bulk of material to be stored and giving it a neater appearance; it is also a protection to the bulb. But do not go too far with the cleaning, and break off any of the dead outer scales of the new bulb. True, they may appear dirty and dull. But they are nature's protection to the bulb against drying and bruising, so leave them on until planting time next spring.

Having dried our bulbs well, and cleaned them, they are ready for permanent storage. The proper place for this is a cool, moderately moist cellar. A suitable place for fruits or roots such as the storeroom for apples or potatoes, will be satisfactory. A temperature of 40° F. (5° C) is about right.

The temperature in the storeroom must not at any time fall much below freezing. Dry, well-cured Gladiolus bulbs will stand a minimum temperature of only about 29° or 30° F. In regions of dry winters, such as the Great Plains region and the Southwest, the air may be a bit too dry in winter, even in the cellar. Then the bulbs may be stored in dry earth or sand. The natural home of the ancestors of our garden Gladiolus is one of dry winters, and their bulbs keep perfectly in the dry, cool soil. Such storage is unnecessary in regions of moist winters, and the usual storage with free circulation of air around the bulbs is all right in most places.

If they are stored in a moist cellar, keep the bulbs up off the floor, either hanging them up in sacks or baskets, or keeping them on shelves. For small quantities satisfactory containers are pasteboard boxes, cigar boxes, or cloth bags. Paper bags may also be used, but there is some danger of their getting torn, and allowing bulbs of different sorts to get mixed. Also, keep the bulbs away from rats or mice. This is less serious with Gladiolus bulbs than with most kinds, as the rodents do not eat them; but they are apt to make holes in the bags and even carry the bulbs around from place to place, mixing up the varieties and colours.

When one has many bulbs to store, it is best to

build racks for them, and keep them in tight-bottomed wooden boxes of uniform size, about three inches deep, possibly fifteen inches wide and any convenient length up to thirty inches. It is a good plan to have a screen cover for each box, to keep out rats and mice, and to tack a label on the front of each on which to record the varieties kept therein. Then small lots of named sorts may be kept in separate bags placed in the box; this will facilitate locating a particular sort if it is wanted during the winter. If only one sort is kept in a box, then it is better to leave the bulbs loose in the box, so that they are freely exposed to the air. In the racks provide two or three inches of free air space between the top of each box and the bottom of the next. Bulbs need air during storage.

There is usually little danger of trouble with storing Gladiolus if the conditions are reasonably good—cool, and neither wet enough to mould nor dry enough to shrivel the bulbs. Sometimes woolly aphis will attack the bulbs in winter, especially if they are stored adjoining a conservatory or other plant house liable to harbour these pests. A good remedy for these, as for all aphids, is dipping the bulbs in a solution of nicotine sulphate or tobacco. The same strength as recommended for spraying, a teaspoon full to a gallon

Wm. Kent, creamy shell pink, has the Kunderdi ruffled type of bloom, but Diener has combined with this a long, many-flowered spike, making a very agreeable flower from any standpoint.

of water, will be satisfactory. After dipping, dry the bulbs before returning them to storage. but it is unnecessary to wash off the nicotine.

If in too warm a place, the bulbs may start to sprout too soon. Some varieties, especially some of the Primulinus hybrids, are prone to do this. Then move them to a cooler place, to hold them back until planting time. If, on the other hand, bulbs are wanted for very early planting, or for forcing in greenhouse or conservatory, then it is advisable to start them with moisture and light for a month or so before planting. For this purpose a well-lighted, but not sunny, shelf or bench at a temperature of about fifty to sixty degrees is good. Press the bottoms of the bulbs into damp moss or sand, and they will usually begin to form small swellings—the beginnings of roots—around the old bulb scar within two or three weeks. With ordinary fall-dug bulbs, it is not advisable to try to start them into growth again before January, as they need a period of two months or so of rest.

Stored in a frost-proof place that is not too warm or too dry, most Gladiolus are easily wintered. But not all kinds are equally easy to manage. Some kinds are poorer keepers than others. Thus some of the very early-flowering kinds and some of the lavender and violet coloured sorts are apt to dry out too much in storage. Kinds that are

poor keepers may often be successfully stored in dry sand.

Even some of the Baby Gladiolus, which are usually fall planted because the bulbs are so difficult to keep over winter, may be successfully wintered in a cold cellar in dry sand. The proper culture of these delightful little sorts will be discussed in the next chapter.

CHAPTER VIII

BABY GLADIOLUS

THE dwarf, early-flowering Baby Gladiolus were among the first to capture the popular fancy. They are as distinct from the usual summer-flowering sorts as night is from day. Despite their small size and peculiar habits, these graceful, airy little flowers are very popular with florists for early forcing, and are extensively grown as outdoor bedding plants on the Pacific Coast, where they are among the easiest to grow of the autumn-planted flowering bulbs. They might be characterized as the Irish among Gladiolus, for they are rebellious little things, and refuse to abide, either in appearance or behaviour, by the standards usually demanded by gardeners. But like many of the insurgents of history, these little flowers have endearing qualities all their own. Even those devout disciples of neatness and symmetry, the Dutch florists, early recognized the merits of these spring-blooming, dainty sorts, which are easily grown throughout southwestern Europe. Indeed, most of the varieties of Baby Gladiolus are the products of the genius of the bulb growers of the Low Coun-

tries. The Dutch have striven to make these flowers conform to their ideals, of erect, stiff, and regular spikes. Fortunately they have had little success in changing the artistic irregularity in both flower and pose which seem to be ingrained in this group of Gladiolus from the Cape of Good Hope.

True, the ideal for the large Gladiolus is a tall, strong, erect stalk, well filled with large rounded flowers. But the Baby Gladiolus, derived from the wild species adapted to withstand the blustery winters at the Cape, get their greatest charm from their slender, wiry, bent stems. They nod in every breeze, and depend upon flexibility rather than strength to survive the spring storms. It is surprising how much beating about these delicate little flowers will stand without being marred. A windstorm that would break down the tall spikes of the large Gladiolus only causes the Baby Gladiolus flowers to bend away from it. The flowers always face horizontally or slightly upward whatever the position of the spike, and they are usually set at a slight angle to the stem, so that if it is horizontal, the flowers face forward in two rows, one on each side of it. The adaptation of the flowers to any position of the stem goes so far that if the stem should be broken and hang down, the flowers still stand horizontally and are right side up. If such a spike is cut and turned erect, each flower will then

be upside down upon it, producing a most unusual effect; the elongated throat blotches are on the top petals instead of the bottom ones, and the lowermost petal stands straight out from the spike, giving a truly orchidlike appearance to the flower.

The curved spikes of the Baby Gladiolus, with each of the flowers poised and facing forward from all sorts of positions, make a very graceful, attractive bouquet, and are easily grouped with other foliage. They are particularly effective where low and spreading rather than tall and massive effects are wanted, and are admirable for luncheon-table decorations and such uses.

The wide-open, star-shaped flowers have rather long, narrow, pointed petals, and the lower ones are usually marked by conspicuous elongated blotches of pale colour, each outlined by an edging of deeper tint than the body colour of the flowers. Their very distinctive markings add greatly to the charm of these dainty little blooms.

In their habits of growth these Gladiolus are quite as individual as in their form and size. Being of a mixed race, their behaviour is far from uniform. But such traits as they have in common set them off as quite different from the usual garden Gladiolus. The demand of the American bulb grower, based on the usual experience with the summer-blooming sorts, is for a big, vigorous plant which

withstands the heat of the summer, and for a large, rugged bulb which winters well in storage. The Baby Gladiolus is rather intolerant of heat, and the bulbs of most sorts of them are small. Moreover, they will not endure prolonged dry storage. So when out of the ground, in the late summer, it is best to keep them in a box of dry sand or earth. Never try to store them in the cellar over winter like other Gladiolus, for they will only shrivel and many of them will die.

Their natural habit is to start growth in autumn, and to make roots and sprouts in the soil, in readiness for the first warm days of spring. In this they resemble the other autumn-planted, spring-blooming bulbs, such as Narcissus, Crocus, Tulips, etc. This habit is with them a harking back to the traits of their ancestors from the Cape of Good Hope. There, all vegetation must make its growth during the cool, moist winter, as the summer is practically rainless. So the wild Gladiolus there grow slowly during the winter and blossom in early spring. Their descendants approach this as closely as they can in our more rigorous climate by getting all ready during winter and making the most of their active growth during the cool of early spring.

There is considerable variation in winter hardiness among Gladiolus. Most of these dwarf sorts,

coming from the mild climate of the Cape of Good Hope, will stand light frosts, but will not endure freezing of the bulbs. So they are in general best suited to the mild climates of the Southern States and the Pacific Coast, in localities where a long, cool spring provides them with a suitable growing season. A few of them are sufficiently hardy that they may be wintered along the southern New England coast with adequate protection by mulching with leaves. Even the foliage of some of the hardiest will withstand a temperature of 20° F. without harm. But if the leaves start in the fall, then are frosted back, the plants are weakened and their foliage marred. So the proper treatment is to plant them late in October or November, just before freezing weather, in well-drained and well-mulched beds, or in coldframes. The bulbs are so small that they should not be planted deeply. The temptation is to plant deeply, as a protection from frost, but about four inches is better than deeper planting. If they are thoroughly mulched, first with brush and coarse material that will not mat down on the young, tender sprouts in early spring, then with a layer of finer material, either leaves, grass, or straw, to form a tight outer covering, they will winter quite as well as with deeper planting. Of course, in very mild localities these precautions

are unnecessary. Uncover them with the first warm days of spring, and give them only slight protection in case of hard freezes thereafter.

The wild ancestral forms of these dwarf Gladiolus require the same treatment as do the garden sorts of Baby Gladiolus, and they constitute an interesting and ornamental group in themselves. They are so diverse and many of them have such odd shapes that they do not seem like Gladiolus at all; they have little in common with our usual garden varieties. Many of the commoner sorts of these wild species have bright colour designs on the lower lip of the flower and are called Painted Ladies.

The earliest flowering of the Painted Ladies is Gladiolus debilis, which is creamy white with a clear-cut design etched in lilac on the lower lip. G. hastatus has pink flowers with dark throat blotches. G. blandus, the Fairest Gladiolus, is the Broad-Leaved Painted Lady of the South African urchins. It flowers late in the spring, and comes in several colour varieties; white, flesh, and pale pink. Some forms of it are ruffled—a characteristic it shares with the dark-blotched white G. cuspidatus. One of the oddest forms is Gladiolus alatus, the South African Kalkoentje. Its unusual form, with huge upper petal and broad winglike side petals, and its distinctive colouring atone for its small size

and low stature. The flowers are bright red, the lower petals being yellow with a sharply outlined red tip to each.

Among the rare and unusual forms are the highly prized Blue Bells, most of which are protected in the wild state by the South African government. G. spathaceus, the Caledon Blue Bell, is one of the finest of them. The blue G. gracilis and pink G. bolusi, the Tulbagh Bell, vie with it in graceful form.

The lilylike Afrikanders and many other sorts are equally interesting. Very few of these species are sufficiently hardy to winter successfully in the North, even with careful protection; and they are rare in cultivation. A few of them, such as G. cardinalis, G. saundersii, and G. tristis, are relatively hardy and of easy culture.

The most winter-hardy of the Gladiolus species are those indigenous to Europe and Asia Minor. All of them have purple or reddish-purple flowers, and they are not in general as handsome as are the South African species. The hardiest are G. communis, G. illiricus, G. imbricatus, and G. segetum; all natives of southern Europe. Probably the handsomest of these is G. imbricatus. Of the Asiatic species, G. byzantinus and the hardier G. atroviolaceus are both pretty forms, and well worth a place in the border in places where the winters

are not too severe for them. The Gladiolus species belonging to this fall-planted group are many of them useful for hybridizing, as well as valuable in themselves.

There are several more or less well-defined groups among the cultivated varieties of the Baby Gladiolus. The different strains have been much intercrossed, and the rigid classification into distinct strains is no longer possible with them, any more than it is with the large-flowered sorts. But each group is characterized by slightly different origin and habit of growth.

The Nanus group comprises the oldest and in it are the smallest and earliest sorts. It includes such dainty little varieties as pink Peach Blossom, white Blushing Bride, and red Crimson Queen. They are sorts derived from the dwarf, rather tender species from the Cape of Good Hope, and are not particularly hardy. The stalks are bent into slender-swaying sprays of blossoms, each flower far enough from its neighbour to be distinct and to show its graceful form to advantage. The star-shaped flowers face horizontally, and are wide open with distinct dark-bordered spots or blotches on the lower petals. The prevailing colours among them are white, pink, cream, red, and purple. The stems are usually short, seldom more than eighteen inches tall, and both leaves and stalks are slender.

Each spike bears six to ten blooms, with three to six of them open at one time.

The second group, slightly later to bloom, are the Colvillei. These have a distinct admixture of the strain of G. cardinalis, the Superb Gladiolus, a mountain species of taller, more robust habit and larger flowered than most of the species. The Colvillei are taller, and of more upright growth than the Nanus, the spikes being often straight and erect. The flowers are more numerous, larger, and face somewhat upward instead of horizontally. Most of them show their relationship to cardinalis by the characteristic long, canoe-shaped blotches of white or cream on the lower petals. Each blotch is bordered with a darker shade than the ground colour of the flower. Among these varieties, the pure-white Bride, red Colvillei, orange-scarlet Ackermannii are good examples. Many other and newer sorts are grown in Holland.

A third group of fall-planted Gladiolus is the Ramosus strain; taller, later, and freer flowering than the others already discussed. They have an admixture of the large, summer-flowering Natal species, G. oppositiflorus, and accordingly are larger, slower-growing plants, and the bulbs are more resistant to drying than most of the others of the dwarf types. But they nevertheless need to be autumn planted, and are relatively early flowering com-

pared to the spring-planted sorts. The flowers are star-shaped, and face horizontally from curved, often branching spikes. One of the Ramosus Gladiolus has another interesting trait. The variety Insignis has bright crimson flowers with darker centres, arranged on an arched spike with the flowers along the top and facing upward in a spray effect, which is odd and pleasing.

The recent work of Van Tubergen in Holland has resulted in some handsome and greatly improved varieties which he classifies as Nanus sorts, and in two entirely new early-flowering strains, the Herald and the Tubergeni races. These are such distinct advances over the old sorts of the Baby Gladiolus type that they deserve special consideration.

Of the new Nanus sorts, Nymph, a white with lens-shaped blotches of cream, edged crimson, is the most striking. Its spikes are of good length, gracefully curved, and bear eight to eleven blooms, three and a half inches across and seven of them wide open at once. Johan de Wet, pale shell pink with large, splashy blotches of white broadly edged purple, is even larger flowered, nearly five inches across. La Fraicheur, rosy white; Liberty, flesh colour; and others of these are equally attractive, though few of them equal the mass of bloom of the Nymph. They bloom at about the same season as the old Nanus and Colvillei varieties, and require similar

treatment. They may be flowered in the greenhouse from April to June.

Van Tubergen has also crossed the best of the Nanus varieties with some of the earliest of the large-flowered Childsi sorts, and produced a very early-flowering race, which he has named the Herald Gladiolus. The earliest of these flower in the greenhouse about two weeks ahead of the Nanus varieties. They are tall, with straight, erect stems and good-sized, wide-open blooms intermediate in form between those of the two parent types. They have the canoe-shaped blotches on the lower petals which characterize the dwarf, early-flowering Gladiolus. Scarlet Joost van den Vondel and salmon-orange P. C. Hooft are both tall and robust. Equally tall is carmine-scarlet Hugo Grotius. Flesh-pink Erasmus and salmon-pink Leewenhoek are shorter, more nearly the stature of the Nanus tribe. These Heralds are the result of Van Tubergen's aim, "to raise an early-flowering race of Gladiolus, flowering at the same time as the Nanus, but having stems rigid and upright that would show the flowers well." He has accomplished all of this and more. He also states that they are continuously blooming in Holland, the side shoots giving another display of bloom in autumn. Autumn planting is recommended for them and they are as hardy, presumably, as are the Nanus varieties.

His newest strain he has baptized Gladiolus Tubergeni. He describes them as "very unlike any other Gladiolus. They have Colvillei-like foliage and grow to about forty inches high. They result from crosses between the best of the Heralds and especially selected large forms of G. tristis concolor." As grown in the greenhouse, these are tall and very slender, with curved spikes and widely spaced, open, shapely blooms of moderate size, about three inches across. Four or five of them open at once, making a handsome spray. Charm has clear rosy pink blooms, Prunella and Glow are different shades of red. They are still earlier than the Heralds, and flower two weeks ahead of them. Their slender, swaying stalks of bright-coloured blossoms make these Tubergeni Gladiolus among the most pleasing as they are the earliest flowering of these recent Holland productions.

CHAPTER IX

CULTURE UNDER GLASS

TO THOSE who know the Gladiolus only out of doors, greenhouse Gladiolus are a revelation. Few flowers respond more handsomely to the gardener's care. They yield longer spikes, larger flowers, and more open at once than in the garden. They are easy to grow indoors as well as outdoors. Indeed, many of the most attractive members of the Gladiolus tribe are more easily grown under glass than outdoors. In the Eastern and Central States, the whole group of the dwarf Baby Gladiolus are much happier in the greenhouse or coldframe than in the garden, though they are most successful and popular bedding plants on the Pacific Coast. I also venture the prediction that many of the finest large-flowered Gladiolus, originated on the Pacific Coast and in Holland, will prove particularly adapted to indoor culture. This is notably true of Early Sunrise and L'Immaculee.

The Gladiolus is most accommodating in greenhouse or conservatory, but is less satisfactory as a house plant for the living room. It demands more

light than the average window affords, and grows long, slender, pale, and without flowers if it does not get its full share of sunshine. Winter-flowering Gladiolus are accordingly best suited for the use of florists and such fortunate people who have either greenhouses, conservatories, or especially well-lighted sunrooms. Of all the strains of Gladiolus, the Primulinus sorts seem most tolerant of shade, and for this reason they are the most adaptable for general indoor culture, though most kinds will thrive in a well-lighted greenhouse.

When in flower they will endure well the dry air of living rooms, which is so injurious to most plants. They would be most satisfactory pot plants if there were any object in keeping them as such. The flowers last so well after cutting that there is little advantage in leaving them on the plant. The most appropriate use of the Gladiolus is as a cut flower in winter as well as in summer.

The best general advice to those intending to grow Gladiolus under glass is that they follow the usual practice of the florists. The florists grow large quantities of many sorts for the spring flower trade, from Easter to Memorial Day, and so they have evolved a method of growing suitable to most varieties.

The first consideration is a proper location. The florists prefer a bright, sunny greenhouse—one

The Orchid (Sprague). a ruffled lavender Prim of large size and of a form resembling Kunderd's Primulinus varieties.

adapted to growing such cool-weather crops as Carnations and Snapdragons. Damp, shady places such as the fern or palm house are useless for Gladiolus, and the rose house is usually considered too warm. Of the proper temperature for the different classes of Gladiolus I will speak more fully later.

What size of bulbs is best? One always wants a maximum of return from the space devoted to indoor plants, and to get this, the best stock available is just right. Large, but young, No. 1 bulbs, an inch and a half in diameter, or even oversize bulbs are to be preferred. Many of these will give two or more full-sized spikes of bloom. Those nice plump No. 2 or No. 3, an inch or an inch and a quarter in diameter, on which the seedsmen will quote you attractive prices, or the old bulbs grown by the florist for summer cut flowers may be suitable for outdoor use. But for the greenhouse, get plump, thick bulbs of large size for the variety. This varies with the kind. Such sorts as America yield large bulbs, two inches or more in diameter; the blue sorts have smaller bulbs, and the dwarf, early-flowering Baby Gladiolus, which are particularly good for forcing, always have small bulbs, seldom an inch in diameter.

The time to plant depends upon the forwardness of the bulbs and the length of time they have been

in storage. Most bulbs are dug in the autumn, in October or November, and are not ready to grow again until they have rested two or three months, at least. So greenhouse planting of Northern-grown bulbs need not begin until January. If they have been kept in a relatively cool cellar meantime, they should sprout promptly. To promote further uniform sprouting it is well to soak the bulbs in water, preferably slightly warm water, for two or three days before planting.

The studies of Mr. Alfred Pridham at Cornell have yielded some interesting facts about the greenhouse culture of Gladiolus. He states that bulbs forced to root in moss placed in a grafting case proved the quickest to bloom. Colour modifications in the flowers were frequent among those produced early in the spring. The colours of the pink varieties were intensified, and flakes and streaks appeared in some of the white and yellow sorts. His tests are yielding a lot of detailed information about the behaviour of the different garden sorts when grown under glass.

Gladiolus are notably free from maladies. The most serious menace to greenhouse culture is a bacterial disease known as neck rot, which causes the lower leaves to become brown streaked and to dry up, and if severe it may cause the stem to rot off just below the soil surface. This disease thrives

in the moist, rather close atmosphere of the greenhouses and it is so widespread among Gladiolus plantations that it is well to take precautionary measures against it, whether it shows on the planting stock or not. It produces black, burnt-looking streaks on the bulb scales. I have had a whole house of nice young Gladiolus succumb to this malady, and they were grown from good-looking bulbs, too. Dipping the bulbs for an hour or so in a dilute solution of disinfectant just before planting is a good practice. Some of the new organic mercury preparations, such as Uspulun, Semesan, or Germisan, are not injurious if used according to the directions furnished with them, and they appear to be quite effective. Dilute formalin, one part of formalin to fifty of water, is also recommended, though one must be sure of the source of the formalin, for the commercial product varies much in its strength.

Keeping the soil relatively dry until the plants have started rapid growth is another good precaution, but is impracticable where Gladiolus are grown among Carnations or other crops, as they frequently are, to save space.

They may be grown in either ground beds or raised benches. If they are grown in beds, they may be planted three or four inches deep, in rows six to eight inches apart and four to six inches apart

in the rows. Beds are preferable to benches, as the soil can be kept more evenly moist in them. If benches are used, they should be deep ones, at least five or six inches in depth, and the bulbs should be planted only two or three inches deep in them, so that there will be enough room for their roots to develop beneath them. Such shallow planting will necessitate greater care in staking the plants than would be necessary with the deeper planting in beds.

A very satisfactory practice is to start the bulbs in three-inch pots and keep them in a cool place, either in a cellar, in the potting shed, or under the benches, watering them only moderately until they are three or four inches tall, when they should be permanently transferred to the beds or benches. Starting the bulbs in pots is doubly advantageous, for as a result the Gladiolus need not occupy the sunny beds so long, thus leaving more space for other plants. The Gladiolus themselves are also benefited by a cool period of a month or so at the start, during which the young roots can get well developed before the tops begin to grow.

The soil for Gladiolus needs to be rich, but not too rich. A layer of half and half well-rotted stable manure and sandy loam at the bottom of the bed as a root run, with sandy loam alone around the bulbs and above them, give very satis-

factory results. Manure in the soil around the bulbs, or above them as a top dressing, is undesirable as it is apt to start rot. Besides this, it is a bad practice to encourage rapid growth by heavy feeding during the early life of the plants, for they are apt to grow slender and weak. A slower growing and sturdier plant will usually produce a better and stronger flower stalk. The early growth may also be regulated somewhat by watering, which should be moderate or even rather light until the plants are in their fifth or sixth leaf.

As soon as the flower stalk begins to swell in the stem, the plant may then be watered and fertilized more liberally. A top dressing of liquid manure of one fifth strength, or of commercial fertilizer at the rate of a half a pound to one hundred square feet of bed may be applied each week until the flowers begin to open. The extra feeding at this time makes larger, finer blooms and longer spikes, and it is well worth while.

The flower stalks of Gladiolus grown under glass are so much taller and weaker than outdoor ones that they need tall supports, either stakes or strings. The tall varieties, such as Early Sunrise, need the top support at least three feet from the soil level, as they may grow five feet or more tall. The dwarf sorts, of the Primulinus and Nanus strains, require no supporting.

After blooming, the plants of all sorts may be gradually dried off for a month or six weeks, if it is desired to save them for another planting. If ripened carefully and if the bulbs are not too old, they may be successfully blossomed a second time under glass.

Most kinds of Gladiolus will grow and bloom well indoors with the treatment outlined. But for the very best results each strain will well reward a little special attention to its particular requirements. Most of the large-flowered sorts—America, Pendleton, Mrs. Francis King, Schwaben, Early Sunrise, Scarlet Princeps, Prince of Wales, Halley, etc.—like the conditions already outlined. They are descendants of Natal and South African mountain species, and consequently like moderate summer temperatures during growth—between 55° and 70° F.

But strains of Gladiolus of different extraction have other requirements. To get the best results from the charming little dwarf Baby Gladiolus—the Nanus, Colvillei, and Ramosus sorts—such as Peach Blossom, Brilliant, Crimson Queen, Blushing Bride, The Bride, and Colvillei, and the fragrant species such as tristis, the Avondblom of the Boers, much cooler conditions are preferable. The temperatures of the lettuce house, 35° to 50,° are not too cool for them. Their ancestors from the Cape

of Good Hope grow slowly through the chilly winter at the Cape, and some of them are very early blooming. Many of them may be started in the greenhouse in early autumn and blossomed in midwinter. These dwarf sorts are so much smaller than the large kinds that they can be spaced closer. Two inches by four inches is ample space for them.

If the only available room in the greenhouse for Gladiolus be in the warm section, with the Roses and Begonias, we may still have Gladiolus to perfection if we choose the right sorts. Many of the Primulinus hybrids, such as Maiden's Blush, Concolour, Firefly, and several others, thrive best at high temperatures—70° to 80° being none too hot for them. Starting these in a cool place in pots for two or three weeks before setting them in the hothouse beds is very beneficial. Not all of the Primulinus sorts show the hot-weather preference of their tropical Maid-of-the-Mist forbear, as they are of very mixed ancestry. All Gladiolus can be grown under glass, provided they are given enough sunlight, are sufficiently rested before planting, and are given a suitable temperature. The Primulinus are among the easiest sorts to grow and are especially recommended for forcing.

All varieties are slower to bloom in the greenhouse than outdoors, for the short days of winter retard the growth of all plants. Bulbs planted

early in January will flower during April and May, three and a half to four months after planting. Later plantings will have a shorter growth period, as the longer days of spring and early summer hasten maturity. March plantings, even if kept rather cool, will yield flowers in June. The different varieties, when grown under glass, will blossom in about the same order as they do outdoors, if grown at moderate temperatures.

Some varieties are hot-weather growers. Maiden's Blush and several of the small Primulinus sorts will bloom quickly at high temperatures, but are relatively slow in the cool greenhouse. The Nanceanus and Childsi sorts, being derived from mountain species, are cool-weather growers. Thus Halley, Rose Pearl, Le Marechal Foch, and Early Sunrise are early bloomers in cool weather or at cool temperatures in the greenhouse, and America, Pendleton, and Schwaben may be somewhat later under the same conditions. The Baby Gladiolus are such early bloomers outdoors that many of them—Peach Blossom, Blushing Bride, Brilliant, Colvillei Red, The Bride, etc.—are recommended for forcing. They do thrive under glass, and are especially suitable where low temperatures are the rule. But they are not quick growers. Planted with Mrs. Frank Pendleton at moderate temperatures, they are even later to bloom! Their earli-

The Opposite-flowered Gladiolus (G. oppositiflorus), a very tall-growing Natal species, is a parent of most of the white and light coloured sorts

Sunnymede, with its orange colouring and red throat blotch, combines the delicate colouring of the Primulinus sorts with the flower form and markings derived from other ancestry

Fortuna has the broadly rounded petals of the Amaryllis-flowered type and likewise the wide spread of side petals derived from the Saunders Gladiolus

Pundibundus, a hybrid between the Superb Gladiolus and the Fairest Gladiolus, has the typical form and markings of the Baby Gladiolus tribe

ness outside is due to their ability to thrive at low temperatures in early spring. Several of the large-flowered varieties are much earlier under glass.

Both earliness and endurance of low temperatures are advantages in plants for greenhouse use. Maintenance of high temperatures over long periods is both difficult and expensive. For this reason, the early-flowering Gladiolus and those requiring little heat are usually preferred, though practically all kinds may be successfully grown under glass.

The graceful, bright-coloured flowers of the Gladiolus, on slender stalks surmounted by the tender green of the unopened buds, are never more welcome than in the winter or early spring. The fact that the blooms are even finer and may be had in greater variety than during the usual summer blooming season simply adds to their charm.

CHAPTER X

CULTURE IN THE TROPICS

THOSE who live in the tropics know how difficult it is to grow the familiar flowers of temperate climates there. The Gladiolus is one of the most successful, and it does best with some special care. The cultivated sorts have been developed in gardens of temperate climates and mainly from South African wild forms. They accordingly thrive best in sunny localities and with moderate moisture. So they do not always take kindly either to the cloudiness or to the warm, moist air and soil of the humid tropics. But the wild Gladiolus have a wide natural range, throughout the length and breadth of Africa, and there are species at home in the equatorial lowlands.

Fortunately, one of the tropical wild forms, G. primulinus, or Maid-of-the-Mist, has proven popular in gardens, and its progeny, the Primulinus hybrids, succeed well and are easily propagated in the humid tropics, where I have seen them both in Hawaii and in the Philippines. They make themselves thoroughly at home, will grow and

flower at all seasons, and they are very acceptable and lasting cut flowers, especially since the native tropical flowers are most of them short-lived, like the Canna and Hibiscus.

While the Primulinus strain is the best adapted to the tropics, other strains, such as the Childsi, Nanceanus, Gandavensis, and Lemoinei likewise flower well in the tropics if grown from new Northern bulbs each year. Such varieties as Mrs. Francis King, Panama, Mrs. Frank Pendleton, America, and Princeps grow well and flower wonderfully the first year from imported bulbs, but after they once go dormant, it is difficult to awaken them again to growth and the bulbs rapidly deteriorate. Cold storage during the rest period has proven beneficial both in the real tropics and in Florida. Particularly stubborn bulbs, like those of America, which rest from ten to fourteen months in the Philippines, were induced to grow after a short rest by a sojourn of a month in the ice chest! The surprising feature of it is that the bulbs seem to keep splendidly in the hot, humid air, or even if left in the wet ground. The bulblets of these sorts are even more stubborn than the bulbs and refused to grow for me at all in the Philippines. So these may be considered as one-year bloomers in the wet tropics, unless they are given heroic treatment.

The dwarf, early-flowering Nanus and Colvillei

strains, the so-called Baby Gladiolus proved utter failures, and died soon after sprouting.

The Primulinus sorts—Lemoine's Salamoneus, Concolor, and Maculatus, and many other sorts—were real successes. The bulbs grew after a short rest of from three to five months, and regardless of whether they were lifted or allowed to remain in the beds. They flowered freely, and grew equally well during the dry season, and during the rainiest season of almost continual downpours. The bulblets also performed quite as they do here at home, all of them sprouting and many flowering during their first season.

The principal precaution for successful culture in the tropics is to provide thoroughly good drainage. Gladiolus everywhere like sunshine and abhor wet feet. This is particularly true in the tropics, where the soil is apt to be saturated a considerable part of the time anyway. So they do best if planted shallow—not more than two inches deep, and in a soil composed of about half well-decayed leaf mould. If the bed is underdrained, so much the better. Next to drainage, they need sun. Shading is even more detrimental to them in the tropics than at home, and they do not seem to mind the brilliant tropical sunlight in the least, though the flowers are apt to be wilted by it, and should be cut when the first flower opens.

With these precautions, and clean culture such as is recommended for them everywhere, as fine Gladiolus may be grown in the tropics as elsewhere.

Gladiolus bulbs imported from Australia and planted during August and September give fine flowers from Thanksgiving until the New Year, and during the Holidays are most welcome reminders of the homeland amid the tropical luxuriance of Bamboos, Bananas, and Palms.

CHAPTER XI

CLASSIFICATION AND RATING

DUE to the work of the early breeders of the Gladiolus and the great talent of and the scientific methods employed by that numerous array of modern hybridizers, we now have forms with an unbounded range of beautiful colours and most diverse markings. Our glorious Gladiolus has colours and tones the most varied brilliant scarlet to pure white, brightest rose to the clearest of yellows, rich royal purples and beautiful velvety maroons, with blends indescribable in words, mottled, spotted, striped, and smoky effects beyond description with flowers large, medium, and small; and last, but not least, all of these effects possible of repetition in the delicate, hooded, wide-spaced Primulinus types, and the Primulinus Grandiflorus with even greater possibilities of colours. The combinations are even more varied than the possible combinations on the chessboard.

On the whole, this flower resembles a Lily in its broad satiny petals, but it is irregular in form, the lower half of the flower usually having small and distinctly marked petals. The ideal form for the florist is rounded and neat. Will the Gladiolus of

the future have forms that are frowsy and irregular and of the cactus shapes so as to imitate the Dahlia and the Chrysanthemum?

To assist in selecting the varieties of highest merit, two ways have been tried of rating the value of the Gladiolus; one by popular vote on the favourite sorts, and the other by scoring them on points according to a percentage scale. The first of these was tried by the New England Gladiolus Society, and the second by the American Gladiolus Society.

In the early part of 1924, each member of the New England Gladiolus Society was invited to send to the Secretary a list of twenty-five "best" or "favourite" varieties. Out of a membership of one hundred and twenty-five there were forty-five who cast their votes for their favourites. The following is a list of the twenty-five varieties that received the largest number. This simple symposium is of some interest as it is the first on Gladiolus of which there seems to be any record.

Number	*Name of Variety*	*No. of Votes*
1	Mrs. Dr. Norton	38
2	Mrs. F. C. Peters	35
3	Mrs. Frank Pendleton	30
4	Gold	29
5	Anna Eberius	28
6	Purple Glory	28
7	Golden Measure	26

Number	*Name of Variety*	*No. of Votes*
8	Marshal Foch	25
9	Evelyn Kirtland	25
10	Byron L. Smith	23
11	Alice Tiplady	23
12	Carmen Sylva	21
13	E. J. Shaylor	21
14	Marie Kunderd	18
15	Diana	17
16	Peach Rose	16
17	Herada	15
18	Prince of Wales	15
19	Richard Diener	14
20	Europa	13
21	Henry C. Goehl	13
22	Mona Lisa	13
23	Pink Wonder	13
24	Crimson Glow	12
25	Louise	12

In the spring of 1924 the American Gladiolus Society decided to conduct a symposium of its own, and a symposium committee of five members being chosen, each member was requested to send to the chairman a list of about one hundred and fifty varieties for consideration. From these a list of two hundred and fifty-seven named varieties was printed and distributed to the general membership of the Society "to be voted on by our members in order to get a list of varieties that combine the best qualifications." The official percentage of standards was used as follows:

One of the Painted Ladies (G. debilis). The dainty tracery on the lower petals gives it a quite unique charm.

Flower	
Colour	25
Size	15
Form	5
Substance	10
Spike	
Length	5
Grace	5
Florescence	
Number blooms open	5
Number blooms	5
Placement	5
Foliage	5
Vigour	5
Disease resistance	5
Productiveness	5
	100

Many members of the American Gladiolus Society consider the results of this symposium as printed in the January, 1925, issue of the Society's *Bulletin* to be of very great importance and value. Those competent to judge feel that the average of those receiving a considerable number of votes is rated about right. Amateurs who wish to find out what is "best" in Gladiolus should study this list with care and make personal comparisons on the basis of the "percentage standard" with the growing flowers. Following is a tabulated rearrangement of the vote with names arranged ac-

cording to the percentage rating received, followed by number of votes received, highest percentage, lowest percentage.

This symposium, although more elaborate than that of the earlier symposium of the New England Gladiolus Society, is only a second attempt, and although much more comprehensive than the earlier one, will serve as a guide temporarily and is inserted for present use and for historical record rather than as a symposium that will have lasting value.

No.	*Name*	*Average*	*Votes*	*High*	*Low*
1	Mr. W. H. Phipps. .	93.6	11	98	85
2	Richard Diener . .	92.0	25	100	82
3	Catherine Coleman .	91.8	19	99	80
4	Dr. F. E. Bennett .	91.7	11	99	80
5	Wm. Kent	91.7	12	100	70
6	Mrs. F. C. Peters . .	91.5	26	97	86
7	Giant Nymph . .	91.2	23	98	80
8	Robert J. Kunderd .	90.7	13	96	84
9	Purple Glory . . .	90.3	54	98	70
10	Golden Measure . .	90.1	51	97	75
11	Jewell	89.8	27	98	75
12	Fern Kyle	89.5	13	95	80
13	Mrs. Richard Lohrman	89.5	12	96	75
14	Virginia Hale . . .	89.3	10	98	70
15	Mrs. Dr. Norton . .	89.1	55	98	65
16	Giant Myrtle . . .	89.0	14	98	75
17	Gold	89.0	36	98	66
18	Ming Toy	88.8	15	96	81
19	Mrs. Leon Douglas .	88.8	17	96	75
20	Jenny Lind . . .	88.7	33	98	75
21	Marshal Foch . .	88.6	35	97	71

No.	*Name*	*Average*	*Votes*	*High*	*Low*
22	E. J. Shaylor	88.4	49	97	70
23	Mrs. H. E. Bothin	88.4	42	99	60
24	Evelyn Kirtland	88.2	52	98	70
25	Masterpiece	88.2	12	95	80
26	Dr. Van Fleet	88.1	20	96	78
27	Marie Kunderd	88.1	29	100	50
28	Anna Eberius	87.9	55	97	72
29	Geraldine Farrar	87.8	14	95	75
30	Mrs. Frank Pendleton	87.6	45	97	70
31	Pollyanna	87.5	11	95	80
32	American Beauty	87.3	37	97	70
33	Peach Rose	87.3	22	98	75
34	Crimson Glow	87.1	47	97	70
35	Mary Pickford	87.1	44	98	50
36	Sheila	87.1	26	95	60
37	Souvenir	87.1	29	98	65
38	Albania	87.0	29	97	55
39	Florence	87.0	11	98	82
40	Mme. Monet Sully	87.0	13	96	78
41	Pink Wonder	86.9	42	99	70
42	Alice Tiplady	86.8	56	99	65
43	Dr. Elkins	86.8	12	97	78
44	Mrs. Geo. W. Moulton	86.8	12	94	75
45	Herada	86.7	47	97	75
46	Elf	86.6	28	95	70
47	Maine	86.6	23	98	60
48	Sweet Lavender	86.6	27	99	70
49	Henry Ford	86.5	10	96	70
50	Anthony B. Kunderd	86.4	30	98	70
51	Elizabeth Tabor	86.4	23	96	65
52	Mrs. John R. Walsh	86.3	16	95	60
53	Carmen Sylva	86.2	35	99	80
54	Diana	86.2	18	96	78
55	Glendale	86.2	13	93	75
56	Snow Glory	86.1	11	96	70
57	Leota	85.9	11	92	82

No.	*Name*	*Average*	*Votes*	*High*	*Low*
58	Mona Lisa	85.8	26	97	60
59	Thomas T. Kent	85.8	14	96	71
60	Henry C. Goehl	85.7	13	92	76
61	Le Marechal Foch	85.5	51	99	55
62	Scarlet Princeps	85.5	28	95	65
63	Chateau Thierry	85.4	16	95	75
64	Maiden's Blush	85.3	26	97	70
65	Remembrance	85.3	12	97	70
66	Flora	85.1	44	98	50
67	Louise	85.1	39	97	50
68	Elkhart	85.0	10	97	75
69	Miss Spokane	85.0	14	94	75
70	Salmon Beauty	85.0	27	96	70
71	Scarlano	85.0	28	97	60
72	Mary Fennell	84.8	38	95	70
73	Peace	84.8	42	96	70
74	Rose Ash	84.8	44	96	50
75	Illuminator	84.7	13	95	70
76	Jack London	84.7	43	99	60
77	1910 Rose	84.7	32	94	65
78	Sulphur Glow	84.7	13	97	72
79	Elora	84.4	17	95	40
80	Europa	84.4	32	95	70
81	Violet Beauty	84.3	15	95	75
82	Neoga	84.1	15	96	75
83	Titanic	84.1	34	95	60
84	White Wonder	84.1	34	96	70
85	War	84.1	34	97	60
86	Muriel	84.0	26	96	65
87	Red Emperor	84.0	22	96	60
88	Adeline Kent	83.8	16	93	60
89	Challenger	83.8	11	98	60
90	Dorothy McKibbin	83.8	16	90	75
91	Romance	83.8	17	92	70
92	Gold Drop	83.6	37	97	60
93	Rose Glory	83.6	35	98	50

No.	*Name*	*Average*	*Votes*	*High*	*Low*
94	Loveliness	83.5	35	98	60
95	Butterboy	83.4	12	95	64
96	Mary Stearnes Burke	83.3	26	97	60
97	Mrs. Francis King .	83.3	10	95	69
98	Myrtle	83.3	33	96	65
99	Early Snowflake . .	83.0	25	95	45
100	Prince of Wales . .	82.9	50	96	50

In the foregoing list are about thirty-eight named varieties that had less than eighteen votes, these being largely new varieties and usually rather expensive. If the beginner wishes to be economical and careful it might be best to choose from the sixty-two remaining varieties. Descriptions, colours, names of the breeders or introducers, and the various characteristics of these varieties together with prices for the bulbs may be had from the trade catalogues, and my final advice as to how to get the most for your money in the quickest possible time in learning most about the Gladiolus, King of Flowers, is to become a member of the American Gladiolus Society. A symposium always shows a desire for knowledge and progress but never is a finality. I hardly expect that as great an advance in perfecting the Gladiolus will be made in the next decade as has been made in the past decade, but of course no one knows. Many beautiful new creations are appearing each year and many that

we to-day consider beautiful will be replaced by better.

For at least the past fifteen years there has been a desire to study the characteristics that enter intc the formation of an ideal Gladiolus.

The latest classification and the one that seems destined to be accepted by all breeders as being correctly proportioned was devised by a special committee of the American Gladiolus Society, and provides for a study of twenty-three characteristics and goes still further by providing for the study of these characteristics from five different standpoints. Ratings are suggested for the Gladiolus from the point of view of Exhibition flower, the Flower in Commerce, and the Flower when used in the Garden or for Landscape Effect, and a separate set of ratings is provided for the Primulinus types, including the Primulinus Grandiflorus. No attempt is made to suggest which varieties are best for exhibition, or commerce, or for landscape effects, but great assistance is at the disposal of all who wish to study particular varieties as to their fitness or adaptability for any special purpose. A careful study of the percentage rating assigned to each of the many characteristics of a variety as studied from the point of view of the exhibitor, or particularly from the standpoint of the commercial needs, and again for best landscape or garden effects or

(if a Primulinus type) from the standpoint of its ideals will very surely be most educational and helpful and must result in our ability better to classify and improve our varieties.

The present percentage ratings are, of course, subject to change just as our ideals are ever changing, and just as the favourite varieties of to-day are likely to be obsolete in many, and perhaps most, cases within the short period of ten or twenty years.

Through the courtesy of the American Gladiolus Society we are permitted to incorporate the instructions for measuring Gladiolus as approved by the Executive Committee of the American Gladiolus Society:

Attempts were made to provide a single scale by which the value of any variety for the different uses might be correctly measured, but it was found that the essential characteristics of a flower for one use were so at variance with the essential characteristics for another use that no single standard could be made which would give with any satisfactory degree of accuracy its value for more than one definite use.

Therefore, a separate measure or scale of points is provided for each of the three principal uses, viz.: Exhibition, Commercial, Landscape, with

additional scales for Primulinus Grandiflorus and Primulinus Type.

Primarily, of course, the idea of scoring is to find out which of the present and which of the new varieties are most nearly perfect according to our present ideals. As the best varieties are determined and recorded and given prizes and publicity they will become the ones most largely used, and the varieties of least merit will be less used and thus forgotten and automatically will no longer be cultivated. And it is greatly to be hoped that a familiarity and an understanding of the Ratings or Score Points will prevent the giving of inflated values to new creations that may be no better than, and perhaps inferior to, those that have been produced and named and that this same familiarity and knowledge about the ideals of the different parts that go to make up the ideal will result in some real effort to replace inferior varieties by better ones. *In a general way the different types are defined as follows:*

EXHIBITION: In preparing the rating schedule for the Exhibition Class an attempt is made to visualize the ideal Gladiolus from a connoisseur's point of view.

It should have a long bud spike with large florets well placed, of attractive form, pleasing colour, and many open at once.

COMMERCIAL: The ideal Commercial Type is that best suited to the requirements of the general florists' trade at the present time.

PRIMULINUS GRANDIFLORUS: The ideal of this type combines the size and dignity of the Exhibition Type with the gracefulness and beauty of the Primulinus.

PRIMULINUS TYPE: Varieties having distinctive hooded blooms and slender stems as characteristic of the Primulinus Species.

LANDSCAPE: This rating schedule refers to the desirability of a variety for the garden or for landscape planting, disregarding its usefulness as a cut flower.

ADOPTED SCALE OF POINTS
TO DETERMINE
VALUES OF GLADIOLUS FOR
DIFFERENT AND SPECIFIC PURPOSES

	Exhibition	*Commercial*	*Primulinus Grandiflorus*	*Landscape and Garden*	*Prims*
FLOWER					
Colour	15	10	15	5	12
Surface texture	5	5	5	∞	3
Effectiveness en masse	∞	5	3	10	8
Size	12	6	8	5	5
Form	5	4	10	∞	12
SPIKE					
Length of stem	5	5	5	∞	5
Florescence	10	5	8		10
main spike				5	
laterals				5	
spikes per bulb				5	
Number open	10	10	7	∞	7
Facing of bloom	8	8	6	∞	5
Spacing of bloom	5	4	8	∞	8

	Exhibition	*Commercial*	*Primulinus Grandiflorus*	*Landscape and Garden*	*Prims*
SPIKE—*Continued*					
Attachment of florets to stem	∞	5	∞	∞	∞
Harmony	10	3	10	∞	10
Keeping quality	5	10	5	16	5
FIELD POINTS					
Foliage	3	3	3	10	3
Vigour	4	4	4	5	4
Productiveness	3	∞	3	∞	3
Bulb production	∞	3	∞	3	∞
Cormel production	∞	3	∞	∞	∞
Earliness	∞	5	∞	∞	∞
Precocity	∞	2	∞	∞	∞
Length of blooming period	∞	∞	∞	10	∞
Ability of stem to support bloom	∞	∞	∞	15	∞
Plant resistance to wind	∞	∞	∞	6	∞

ADDITIONAL PENALTY: If a variety has any defect so serious that it does not seem to be fully provided for in the scales its score may be cut not to exceed five additional points. This is provided for extreme cases only and must be used with caution. For example, a variety of such weakness as to make it very hard to propagate and flower should have this additional penalty under vigour in all scales, unless possibly it might be exhibition. A bloom so small and ill formed as to render void all its good qualities as an exhibition flower should get the additional penalty in the exhibition scale at least. Such a provision is necessary to prevent an enhanced score being

given to a variety that is extremely defective in some certain feature but otherwise good.

If there were to-day any Gladiolus that we considered as ideal or perfect they would score according to the figure in the preceding table, but as in all other things perfection has not yet been attained so we must score accordingly.

No provision has been made for credit for adaptability for greenhouse forcing for several reasons: first, the American Gladiolus Society is not now provided for making proper official tests of this particular quality, and, secondly, in a very few years a separate classification and scale should be provided for forcing varieties. The proper construction of such a scale will require knowledge that is not now available. This, however, is a valuable field for immediate experiment and development.

A definite number of points have been indicated under Exhibition, Commercial, and Primulinus scales which are to be awarded only after field tests. The scale for Landscape use should be entirely arrived at in the Test Garden.

TERMS IN CONNECTION WITH THE DESCRIPTION OF VARIETIES

FLECKING: Flecking consists of dashes of another colour or shade on any part of the bloom ex-

cept the throat. Flecks may be large or fine and are usually irregular.

Border or Edging: This quality occurs when another colour is present, either solidly or as flecks on the petal edges.

Blotches: Large, regular, or broken areas of solid colour, usually darker than the balance of the flower, may occur on the lower petals.

Feather: A solid narrow area of darker colour, resembling a feather in shape, may occur at the base of the lower petals.

Plume: A combination of feather and hair lines at the base of the lower petals is designated as plume.

Self-Colour: In a bloom of practically one colour, the throat may be, and usually will be, of a slightly different colour tone than the outer portion of the petals. The throat may have inconspicuous small dots or lines as long as the effect of one solid colour for the bloom is not thereby disturbed.

Primarily, of course, the idea of scoring is to find out which present and new varieties are most nearly perfect according to present ideals. As these are found out and recorded and given prizes and publicity they will become the ones to be used most largely and the less meritorious varieties gradually will be forgotten and automatically drop out of the race. And it is greatly to be hoped that a familiar-

ity and an understanding of the Ratings will prevent the giving of inflated values to new creations that may be no better and perhaps inferior to those that have already been produced and named, and also that inferior varieties that are already named may be discarded more quickly.

EXPLANATIONS REGARDING SCORING[1]

COLOUR should be pleasing and clear rather than unharmonious or muddy, and is a matter left largely to the discretion of the judges. Penalty is given for muddiness and in cases of flecking and inharmonious colour combinations. It will be noted that colour is of greatest importance to the Exhibition and Primulinus Grandiflorus Gladiolus, 15 points being set aside for the ideal, and for the Primulinus types the colours should be clear soft blending in tints and shades with self-colours considered especially tending toward the ideal. Uniform veining may or may not be objectionable. Ten points are allowed in the Commercial class, 5 points for the Landscape, and 12 points for the Primulinus class. Colour in the Commercial va-

[1]In this discussion of classification and rating of the Gladiolus, the directions for scoring will, in many cases, be given without quotation marks in the words of the instruction book, but the arrangement will be entirely different. In this discussion each characteristic of the flower will be studied simultaneously for each of the five classes, Exhibition, Commercial, Landscape or Garden, Primulinus Grandiflorus, and Primulinus so as to point out as clearly as possible the characteristics that should be striven for when choosing or perfecting varieties for each of these five different classes.

rieties is of high importance not only in the individual flower but also when the flowers are considered when massed. For the Landscape live bright colours are desirable but, as noted above, about 5 points are allowed for this quality as a greater number of points has to be provided for length of blooming season, ability of plant to support bloom and resist wind, and for keeping qualities over the longest possible period. For the Primulinus varieties colours of soft and delicate tints are ideal with the exceptions of yellow which should be quite bright, and contrasting shades or decided blotchings are considered defects. A score of 12 points is named for the ideal.

Surface Texture: For the Exhibition and the Primulinus Grandiflorus blooms 5 points are allowed for the perfect surface texture. This quality determines the warmth, life, sheen, and apparent depth of colour, and if unsatisfactory, penalties should be given for hard, shallow colour effects. For the Commercial varieties 5 points are allowed for surface texture, and it should be judged in the same manner as is the Exhibition variety. Surface texture is of relatively little importance to the Landscape variety and no score is provided. The surface texture for the Primulinus is of relatively small importance, 3 points being allowed.

Effectiveness en masse. This evidently is of no importance to the Exhibition flower—the individual flower being all important—and no score is provided. The Commercial varieties are used more in groups than as separate flowers and so a score of 5 points is provided. A variety whose individual blooms are not particularly pleasing may be very effective en masse. A score of 3 is provided for the Primulinus Grandiflorus, thus showing that this quality is not of great importance for this class. For the Landscape or Garden variety the effectiveness of the flower in mass planting is of the very greatest importance and a score of 10 points is provided. This same quality is of importance in the Primulinus varieties and is judged by the impression produced by a single variety when used for any decorative effect. A score of 8 points is provided for this quality.

Size: Good size is of very great importance for the Exhibition Gladiolus and full count of 12 points is given for one having a maximum diameter of six inches. Measurement should be taken from tip to tip of petals without distorting them. Reflex petals may be straightened out but must not be stretched. Score according to the following scale:

6″	diameter (or over)	10 points
5½″	"	9 "
5″	"	8 "
4½″	"	7 "
4″	"	6 "
3½″	"	4 "
3″	"	2 "

A smaller size is suitable for the flowers that are sent to the market and the florist and a score of 6 points is allowed for perfection. The florets should be fairly uniform in size throughout the length of the spike. Score as follows:

4½″	diameter (or over)	6 points
4″	"	5 "
3½″	"	3 "
3″	"	1 "

Size is of considerable importance also for the Primulinus Grandiflorus, 8 points being allowed for perfection. Score according to the following scale:

5½″	diameter (or over)	8 points
5″	"	6 "
4½″	"	4 "
4″	"	2 "

For Landscape and Garden Effects florets three inches to four inches in diameter are considered better than if larger or smaller and 5 points are allowed. Penalize for extremely small or very

A Baby gladiolus of the Ramosus strain, with the long, slender swaying stalks and gracefully poised star-shaped flowers that characterize this group

large flowers. The ideal size for the Primulinus type ranges from two and a half inches to four inches and 5 points are allowed. Either larger or smaller flowers would naturally detract from their airy daintiness, which must be maintained.

FORM: The full count is 5 points for the Exhibition flower and the blooms must be well expanded and of almost any pleasing shape, but not decidedly hooded, or tubular, or unpleasantly formed. Penalize for lack of uniformity in arrangement of petals and for extreme looseness if it makes for unattractiveness. When scoring the form for the Gladiolus for Commercial purposes, 4 points are allowed and the conditions for perfection are the same as defined under the Exhibition class. The score for perfection of form of the Primulinus Grandiflorus is 10 points, this being considered of even more importance than the form of the Exhibition varieties. It must be graceful, attractive, well-proportioned, breaking away from the formal, conventional Exhibition type. It must retain the balance, openness, and dignity of the Exhibition type without the conventional stiffness. It must add to the Exhibition qualities the gracefulness and attractiveness of the Primulinus types. Several distinct types are included under Primulinus Grandiflorus, such as the butterfly type with upper central petal extended forward, with wide-spread-

ing wing petals and the three lower petals smaller; the open typed form, with petals of nearly equal size which may be rolled, reflexed, or frilled; and the vertical oval type. Penalize forms approaching the long wide hood or loose and floppy or stiff and conventional. Moderate hooding may not be objectionable. For the landscape and garden flower the detail of form is of comparatively little account and no score is provided for this quality. Form for the Primulinus type, however, is all-important, and a score of 12 points is given for the ideal. There must be a definitely hooded bloom and unequal segments, with winged, butterfly, or orchid shapes as the most desirable. The petals should be well opened except for hood and there should be a pleasing distinctiveness in form. Penalize for tubular form. The large score of 12 points seems wise for we should do everything possible to encourage the use of this type of airy daintiness, and we should strive to maintain and improve and emphasize the slender, wiry, gracefully tapering stems, the branching habit, and the grace of foliage available in these beautiful Primulinus varieties.

SPIKE

The spike includes the stem, flowers, and buds taken as a whole.

Length of stem: For scoring purposes the length of stem is considered to be that portion of the stem below the first flower as ordinarily cut without harmful effect on bulb production. For the Exhibition Gladiolus this should be slightly longer than the remaining flower head and should be scored as follows:

5	points	for	24″	or	more
4	"	"	20″	"	"
3	"	"	17″	"	"
2	"	"	14″	"	"
1	"	"	12″	"	"

For the Commercial Gladiolus the same definition holds except that the stem should be decidedly longer than the remaining flower head and the scoring is according to exactly the same scale as for the Exhibition Gladiolus and the same number of points is allowed. For the Primulinus Grandiflorus the stem should be slightly longer than the remaining flower head and a score of 5 points is allowed for the ideal. The length of stem and the points allowed for perfection are the same as in the Exhibition and Commercial classes.

For the Garden or Landscape variety the length of stem is of practically no importance and no score is provided. For the Primulinus type the stem should be somewhat longer than the remain-

ing flower head with an approximate ratio of 3 to 2 and should be scored according to the following scale:

5	points	for	18″
4	"	"	16″
3	"	"	14″
2	"	"	12″

It will be noted that the stem is of comparatively small importance from the standpoint of scoring but that the florets on this stem are of equal importance as when considered for exhibition.

Florescence: Florescence simply means the total number of blooms and buds on the main spike and naturally is a matter of much importance. For Exhibition purposes twenty blooms and buds are allotted the perfect score of 10 points. The points given for this quality are as follows:

10	points	for	20 or more.
9	"	"	18
8	"	"	16
7	"	"	15
6	points	for	14
5	"	"	13
4	"	"	12
2	"	"	11

For this same quality when scored for use for the florist 5 points are allowed for the ideal. The complete score is as follows:

5	points	for	15 or more
4	"	"	14
3	"	"	12
2	points	for	10
1	"	"	8

Florescence for the Primulinus Grandiflorus type is considered of slightly less importance than for the Exhibition and Primulinus types, 8 points being allowed for the ideal, which is 16 florets. The complete score is as follows:

8 points for	16 or more		5 points for	13	
7 "	"	15 " "	4 "	"	12
6 "	"	14 " "	2 "	"	11

For Landscape or Garden use a somewhat different judgment is required. Five points are allowed as the ideal of 15 or more blooms and buds on main spike; 5 points more for 15 on laterals, and 5 points if two spikes are produced from each bulb. For all judging of Landscape or Garden varieties the scoring should be done in the field. For the Primulinus varieties florescence is of much importance and 10 points are allowed for the ideal. Score as follows:

10 points for	15 or more		6 points for	11	
9 "	"	14	4 "	"	10
8 "	"	13	3 "	"	9
7 "	"	12	2 "	"	8

NUMBER OPEN: Another quality having to do with the florets of great importance to the beauty and appearance of the flower as a whole is the number open at the same time. Ten points are

given for the ideal in the Exhibition and the Commercial classes, with 7 points for the Primulinus Grandiflorus, and 7 points for the Primulinus, with no score for the Landscape where this quality is not the important point, the important point being the length of blooming season. Score for Exhibition according to the following scale for the number of unwilted blooms open or partly open at one time:

10 points for 10 or more	6 points for 6
9 " " 9	5 " " 5
8 " " 8	3 " " 4
7 " " 7	1 " " 3

For judging for the florist use score according to following scale for number of unwilted blooms open or partly open at one time:

10 points for 8 or more	6 points for 5
9 " " 7	4 " " 4
8 " " 6	2 " " 3

For the Primulinus Grandiflorus type score as follows for the number of unwilted florets open or partly open:

7 points for 8 or more	4 points for 5
6 " " 7	3 " " 4
5 " " 6	1 " " 3

No score is provided for the number open in the Landscape and Garden class.

In the Primulinus class the perfect score of 7 points for the number of unwilted blooms open or partly open at one time is awarded as follows:

7 points for 8 or more	4 points for 5
6 " " 7	3 " " 4
5 " " 6	1 " " 3

Facing of blooms: Facing is the position of the florets in relation to the stem and to each other. The florets should face nearly straight out from the stem, and if in two rows the angle between them should not be greater than 90 degrees. Penalize for florets which face upward, downward, opposite, spiral, or for those facing irregularly. It is not desirable that flowers should turn in toward each other or that they should form a single row. For perfect facing 8 points are allowed for Exhibition purposes, 8 points also for the florist use, and 6 points in the Primulinus Grandiflorus class, with 5 for the Primulinus class. No score is provided for this quality for Landscape or Garden effect as it is a matter of minor importance.

Spacing of bloom: Still another quality of the florets for which points are allowed is the spacing of the blooms. The spacing should be harmonious and depends somewhat on the size and character of the florets. The larger florets would naturally be spaced somewhat farther apart than smaller

ones. Slight overlapping might sometimes be allowed although neither crowding nor unsightly large open spaces between blooms are desirable, and if objectionable should result in penalizing. When judging for Exhibition purposes 5 points are allowed for the perfect score. For spacing of bloom 4 points are awarded for the ideal in the Commercial class, and full credit may be allowed for somewhat closer spacing but penalize more severely than in the Exhibition class for too wide spacing. In the Primulinus Grandiflorus class the spacing of the blooms is of rather great importance, 8 points being allowed for the ideal. In general, the spacing should be a little wider than in the Exhibition class in order that the beauty of the individual florets may be more easily noted. This is a quality of minor importance for any variety used in the garden or landscape effect and no score is provided. But with the varieties of Primulinus type this quality becomes of greater importance and a score of 8 points is provided for the ideal. The spacing of the Primulinus species is rather wide and the spacing of the Primulinus varieties should be somewhat similar. A very large number of florets crowded closely together would not look airy or graceful.

ATTACHMENT OF FLORETS TO STEM: This quality refers primarily to the angle formed between

the unopened bud and the stem. Buds that lie close to the stem will stand packing and shipping in better shape than those which project away from the stem at a wide angle. This is of considerable importance for the Commercial varieties only and a score of 5 points is allowed for the ideal. No score is provided for this quality in judging for Exhibition, Primulinus Grandiflorus, Landscape and Garden, nor for the Primulinus classes.

HARMONY: Harmony of the spike is produced through proper relation of the stem to the flowers. The stem must be suitable for the type and arrangement of the flowers it supports. It may be large or slender, straight or willowy, or even curved if in harmony with the flowers. Penalize if these qualities are lacking. For judging a variety for Exhibition purposes 10 points are allowed for perfection. This quality is of much less importance when judging a variety for florist use, and only 3 points are given for the ideal. For the Primulinus Grandiflorus class allow 10 points for perfection and penalize heavily for stiff heavy stems. As it is of very little importance when judging a Landscape or Garden variety no score is provided. Again it becomes of great importance when judging a Primulinus variety and a score of 10 points is provided for the perfect score. The beauty of the Primulinus varieties is largely dependent not only on delicate

colouring but also on general symmetry and gracefulness of the entire spike. Penalize strongly for inharmonious effects.

KEEPING QUALITY: For the Exhibition Gladiolus 5 points are allowed for keeping quality, which is the ability to withstand a warm room without drooping and a reasonable amount of handling without breaking or blemishing, as well as its lasting quality. Keeping quality is best determined by observation over a period of days but is to a certain extent indicated by the thickness, firmness, and toughness of the petals. The rating for this quality for the florist or flower market is of course of very great importance and the larger score of 10 points is given for the ideal. The keeping quality is determined in the same way as for the Exhibition Gladiolus and it is also of importance that the stems should not soften to such an extent that they do not properly support the florets at the tip of the spike. The keeping quality for the Primulinus Grandiflorus, which is an Exhibition type, has a score of 5 for the ideal stem, as in the Exhibition class. For Landscape or Garden use the keeping quality is of even more importance than when the Gladiolus is used for any other purpose and the very high score of 16 points is allowed for perfection in this characteristic. By keeping quality is meant: (1) bud resistance to wilting and

burning, (2) bloom resistance to fading in sunlight, (3) bloom resistance to wilting and burning, (4) bloom resistance to fading or spotting in rain, (5) resistance of the bloom to mutilation by wind. Penalize for any of these defects. For the keeping quality of the Primulinus varieties the score for perfection is 5 points, the same as for the Exhibition classes, and is determined by the same rules and conditions. The Primulinus varieties should be seen in ever-increasing quantities in exhibitions, and in home decorations, especially in wide bowls for dining-room and living-room tables, and should be used in landscape and garden effects if varieties with fairly short stems can be selected.

FIELD POINTS

Field points are of relatively small importance when judging the large-flowered or Primulinus varieties for Exhibition purposes, there being only 7 points allowed for the several characteristics under this general heading. Field points have a total score of 30, however, when judging a variety for Commercial qualifications, and a total of 49 points when judging a variety for its qualifications when used for Landscape or Garden Effect.

FOLIAGE: Foliage should be plentiful, of good breadth and height, and of healthy colour, and for full count 3 points are allowed when judging varie-

ties for Exhibition, for Commerce, or when judging Primulinus Grandiflorus and Primulinus varieties. For Garden or Landscape varieties the foliage should not only be broad and abundant but also should be of a beautiful green colour throughout the whole season and 10 points are allowed for the ideal.

VIGOUR: Vigour is indicated by prompt growth after planting, strong plants, bloom production, and sound healthy bulbs. Four points are allowed for perfection in this quality for Exhibition, Commercial, Primulinus Grandiflorus, and Primulinus classes. Vigour is of slightly greater importance for varieties that are to be used in Garden or Landscape Effects. They must grow well and produce good blooms under varying soil conditions and in competition with other plants, and 5 points are given as a perfect score.

PRODUCTIVENESS: This is determined by the increase through division, cormel production, and percentage of their germination under normal conditions. In the Exhibition, Primulinus Grandiflorus, and Primulinus classes 3 points are allowed for perfection and no score is provided in the Commercial and the Landscape and Garden classes.

BULB PRODUCTION: Commercial varieties must readily produce good, sound, first-size bulbs to receive full credit, which is 3 points, and for the

Landscape and Garden varieties. No score is provided for the Exhibition, Primulinus Grandiflorus, and Primulinus classes.

CORMEL PRODUCTION: For Commercial varieties score according to number of cormels produced and percentage of germination under normal field conditions, allowing 3 points for the ideal.

EARLINESS: The importance of earliness is primarily due to the better prices obtainable for the first blooms on the market. The number of days from planting to blooming is so largely influenced by locations, climatic conditions, and winter storage that a definite standard cannot be made. Earliness is best determined by simultaneous planting with some recognized standard early variety. For full count 5 points are allowed for the Commercial varieties and no score at all is provided for the Exhibition, Primulinus Grandiflorus, Landscape and Garden, and Primulinus classes.

PRECOCITY: This again is a quality of special value for Commercial varieties and is the ability to produce fair blooms from the smaller sized bulbs and cormels and 2 points are allowed. No points are allowed for other than the Commercial classes.

LENGTH OF BLOOMING PERIOD: This is a matter of great importance only for those varieties used for Garden or Landscape Effect and 10 points are allowed for a blooming period of twenty-four days

between the opening of the first and last bloom produced by a single bulb. No score is provided for the other classes.

ABILITY OF STEM TO SUPPORT: This again is a quality pertaining to those varieties used for Garden or Landscape Effect and is of so much importance that 15 points are allowed for the stem that is able perfectly to hold the bloom head in upright position without artificial support. In general, low-growing varieties such as Alice Tiplady are especially adapted for Landscape Effect, but in certain cases even taller growing varieties are of value. Considerable thought is being spent at the present time among Gladiolus enthusiasts in determining a larger number of varieties that are deemed suitable for Landscape and Garden uses. No score is provided for this quality in the other four classes.

PLANT RESISTANCE TO WIND: Varieties used for Garden and Landscape Effects are allowed 6 points if they can perfectly withstand severe summer storms without material injury. No score is provided for this quality in the other four classes. Field points will be studied especially in the trial fields of the official test plots and will be based on the reports of the official in charge.[1]

[1]The American Gladiolus Society has had printed blocked Work Sheets (which may be had for a small sum by the members of the Society) which may be used in the garden for the study and recording or scoring of varieties when they are in bloom. These sheets also provide spaces for filling in the Name of Variety, Date of Planting, Date of Blooming, and the Date of Scoring and the Name of Person making the score.

If there were to-day any flowers that we considered as ideal or perfect they would score according to the figures in the Standard Scale called "Classification and Rating of the Gladiolus" but, as in all other things, as perfection has not yet been attained we must score accordingly.

It is hoped that judges and various individuals may become so familiar with these percentages that scoring may be done in such a manner that all may arrive independently at practically the same results.

Primarily, of course, the idea of scoring is to find out which present and new varieties are most nearly perfect according to present ideals. As these varieties are determined and recorded and given prizes and publicity, the less meritorious varieties gradually will be forgotten and automatically drop out of the race. It is greatly to be hoped that familiarity and an understanding of this subject of Rating will prevent the giving of inflated values to new creations that may be no better and perhaps inferior to those that have already been produced and named and that the inferior varieties that are already named may thus be discarded more quickly.

If you will refer back to page 187 and read the table giving the score of points for the various characteristics, you will find that the summaries are as follows:

	Exhibition	*Commercial*	*Primulinus Grandiflorus*	*Landscape and Garden*	*Prims*
Flower	37	30	41	20	40
Spike	53	50	49	31	50
Field Points	10	20	10	49	10
Totals	100	100	100	100	100

Whenever one is dealing with ideals one is dealing with a difficult subject, and one is subject to criticism, and arguments are likely to arise. This latest awarding of points to be given in scoring the different qualities of the different parts of the Gladiolus for Exhibition, Commercial, Primulinus Grandiflorus, Garden and Landscape, and Primulinus classes is a great step in advance over what has gone before. It is not claimed that the present percentages as awarded are correct, and they are subject to changes and improvements. It will be noted that as divided the "Spike" has more points in some cases than does the "Flower," but it should be noted that "Florescence" (the total number of florets and buds) and "Number Open," which are both qualities of the "Flower," are tabulated under "Spike."

It is very evident that the "Field Points" are of relatively small importance when judging the Primulinus and Primulinus Grandiflorus varieties and when judging large-flowered varieties for Exhibition purposes. It is equally obvious that

The Herald gladiolus have straight erect stalks of attractive flowers and are extremely early blooming sorts.

The Tubergeni sorts are among the very earliest flowering of the whole Baby gladiolus tribe. Their brightly coloured flowers have all of the slender grace that endears this whole class of autumn-planted gladiolus to people of artistic taste.

"Field Points" are of considerable importance when judging Commercial varieties and of tremendous importance when studying or judging a variety to see if it is suitable for a Garden or Landscape Effect.

A STUDY IN COLOUR

For the beginner who might have seven Gladiolus bulbs that would produce seven flowers, one each of red, orange, yellow, green, blue, violet, and white, colour would be a matter of slight difficulty, but with 10,000 named varieties of almost every known hue, tint, shade, and tone, the simple but inexact terms such as rose, purple, light red, dark red, etc., mean little and cannot be depended upon for exact descriptions. In 1912, Robert Ridgeway,[1] after more than twenty years of study on the subject of colour, published "Colour Standards and Nomenclature," suitable for the botanist and for the description of colours of flowers. This book contains 53 pages of colour plates, each plate containing 21 colours, which with black and white made 1,115 named colours. With the aid of this splendid array of colours one may describe a Gladiolus bloom so that someone in a distant land may understand the colouring by refer-

[1]Ridgeway's Colour Standard may be obtained through the American Gladiolus Society.

ring to the Ridgeway Colour Chart. This is a valuable book and somewhat expensive, but it is valuable as a guide for those who wish to describe colours accurately. In describing Gladiolus blooms the colours of the Ridgeway Chart should be used. It is exact, scientific, and educational, both to the one giving the description and to the one who interprets it.

CHAPTER XII

GLADIOLUS SOCIETIES

IN OUR present-day fervour for efficient organization there are societies to promote almost everything, and horticulture has come in for its share. If you wish to know the latest about fruits, vegetables, or flowers, just join the nearest horticultural society or garden club, subscribe for a magazine, and the newest of methods and ideas are brought to you in agreeable and readable form. The Gladiolus, with its steadily increasing popularity, has always been given seasonable notice by the societies of general character and there are a number of new ones springing up which are devoting themselves exclusively to this flower.

Such organizations as the Royal Horticultural Society of Great Britain, and the state horticultural societies of Massachusetts, New York, and Pennsylvania have annual exhibitions of Gladiolus, giving one, two, or three days to it exclusively. More and more the national and state agricultural organizations are offering premiums for it at their fairs. Sometimes these are very extensive, as was the case recently at the Iowa Mid-Western Exhi-

bition where more than $2,000 in prizes were offered for Gladiolus alone. Thus it is made one of the important exhibits. Then, again, the garden clubs throughout the country and local Gladiolus societies in groups of states, such as New England, in small towns and in small sections have Gladiolus exhibitions or flower shows in which the Gladiolus plays an important part.

This flower enjoys a wide popularity in Holland and in the other countries of Europe, also in Australia, New Zealand, and Japan. The British colonials in South Africa, particularly around Cape Town, take a lively interest in collecting the many species of the wild Gladiolus of South and Central Africa, of which there are nearly 200 kinds in all. Some of the forms have been almost exterminated by ardent collectors and many of the species are not nearly so common as they were a decade or so ago. Efforts are being made to see that those species that are few in number are preserved from extinction. The South Africans also take an interest in the modern varieties and there is a growing demand for the newer sorts.

Up to a few years ago the Gladiolus enjoyed the greatest popularity in Holland, England, France, and Germany, but to-day it commands more attention in the United States and Canada than in any other parts of the world.

The work of the American Gladiolus Society in furthering the interest in and the development of the modern Gladiolus is of prime importance. The formation of this Society in Boston on May 27, 1910, was the beginning of an organized movement to bring the Gladiolus prominently to the attention of the American flower-loving public. A little band of thirteen men gathered at Horticultural Hall, Boston, and formed the society which now numbers about five thousand members and is growing so rapidly that it may become before long the largest of any society whose object it is to further the interests of one particular flower. Those thirteen enthusiasts who gathered and started this great society were J. K. Alexander, Prof. George E. Stone, Arthur Cowee, Arthur T. Boddington, I. S. Hendrickson, Montague Chamberlain, W. E. Cahill, Maurice Fuld, Eugene N. Fischer, Robert Cameron, Prof. L. S. Judson, J. B. McArdle, L. Merton Gage. About sixty others had signified a willingness to join such a society.

We are moving forward very fast to-day in mechanical ways, but in modifying our aims and ambitions we seem to be more deliberate. When Abraham Lincoln, as a young man, was speaking at county fairs he told the farmers of the importance of making two blades of grass grow where one grew before. Just the same story is being preached

to-day. So in the Gladiolus world the aims of sixteen years ago are still the aims of to-day, and the progress during that time has but demonstrated the soundness of the earlier counsel. At the first meeting of those thirteen men in 1910 the objects of the society just formed were declared as follows:

The Society is formed for the purpose of stimulating interest in, and promoting the culture and development of, the Gladiolus; to establish a standard nomenclature; to test out new varieties and to give them such recognition as they deserve; to study the diseases of the Gladiolus and to find remedies for them; and to disseminate information relating to the flower; to secure uniformity in awarding prizes at flower shows, and to give one exhibition each year.

While we still have about the same objects and the same problems of improvement that we had sixteen years ago, much has been achieved in those years, and interest in the Gladiolus has been stimulated to a wonderful extent. During its early years, the Society struggled along with the publication of its bulletins, and for a time these were practically discontinued. It has now grown strong enough so that it boasts a monthly *Bulletin* devoted exclusively to Gladiolus—an achievement possible with few other flowers.

There have been many thousands of different varieties of the Gladiolus named by many different growers, not only in this country but abroad. In many instances these names have been duplicated with entirely different varieties, and many of these have been named which have never become articles of commerce, and are, therefore, not entitled to the name. A few years ago a work was started to get all of these different names listed under a nomenclature, and this work has been carried on by Mr. Clark W. Brown who, without any reimbursement whatsoever, has endeavoured to collect all the data relative to new names, dominating colour, name of originator, and the year in which it was shown, and this work has really been the means of preventing the duplication of many other names. However, it remains for the American Gladiolus Society to bring up to date the work started by Mr. Brown and revise it so that in the very near future a "Nomenclature of Gladiolus" will be available which will contain a lot of information for those interested.

The Society is now registering all names in the secretary's office, and when the details of those varieties that were brought out years ago can be collected the list will then be published in regular alphabetical form. In place of having many thou-

sands of names of different varieties it will be reduced to just such varieties as are well known and have actually been brought into commerce.

Soon after the national society was organized, testing grounds for Gladiolus were established at Cornell University and some seventy-two growers from all over this country and abroad sent bulbs to it. Many varieties were grown and comprehensive records kept. The results of this early work are assembled in three bulletins, published at Cornell in 1916. These constitute about 375 pages and appear to be the most valuable literature yet published on the Gladiolus. The titles and contents of these three valuable bulletins are as follows:

Gladiolus Studies I
Botany, History, and Evolution of the Gladiolus, by Alvin C. Beal, December, 1916

Gladiolus Studies II
Culture and Hybridization of the Gladiolus by Alfred C. Hottes, December, 1916

Gladiolus Studies III
Varieties of the Garden Gladiolus by Alfred C. Hottes, December, 1916.

The preface of *Studies II* records the fact that the *Bulletin* is the result of four years of work at the Trial Grounds of the A. G. S. at Cornell. The Bibliography of the Gladiolus in *Studies I*

consists of nearly twenty pages of printed references in several languages, and the Bibliography contained in *Studies II* consists of about eleven similar pages. *Studies III* is equally carefully prepared but as far as varieties therein named are concerned there are only about a half dozen that were included in the 100 attaining the highest score in the 1924 Symposium of the A. G. S. Since 1916 no further bulletins on Gladiolus have been published from Cornell.

The secretary of the American Gladiolus Society, Mr. John C. Davis, has the following to say about recent activities of the Society:

"In 1923 the Society concluded that in order to get the data that were necessary to ascertain the worth of not only the older varieties but those that were constantly being originated it was absolutely necessary that they establish their own Trial Grounds and put a competent man in charge to study them closely throughout the summer and make his records so that all the characteristics that entered into the construction of a good variety of Gladiolus might be honestly measured by a disinterested party and the correct rating given to such. This work met with immediate favour among the growers and hybridizers of the country who had been very much disappointed in the results obtained from other trial grounds, and each

year the Society's grounds are not only gaining in popularity but are increasing in number of varieties at a very rapid rate.

"To stimulate interest in this work the Executive Committee of the American Gladiolus Society determined in 1926 to offer what was to be known as a 'Grand Challenge Trial Ground Trophy,' valued at $500 to be awarded the best seedling being grown in the Trial Grounds, the winner to compete for it until he had won it three different times, not necessarily in succession, in order to hold it perpetually.

"In connection with these Trial Grounds the Society has also established what is known as the A. G. S. Exhibition Garden where any of its members who desire to exhibit their new creations at the Shows may send their bulbs and have them grown for exhibition purposes. This offer is open only to such members who live outside a distance of 400 miles from Rochester, as those within this distance could readily cut and bring their flowers to the Exhibition.

"The Executive Committee has created an entirely new committee which devotes its entire energies to extension work. Through this committee local and state Gladiolus societies are being formed, the state society being affiliated with the national body of the American Gladiolus Society,

and each of the local societies being subservient to the state in which it is located as its parent. All of the members of these societies receive the monthly *Bulletin* and other publications, as issued, and in all other respects receive and are entitled to the same privileges as any direct member of the Society. This extension work is being rapidly carried on, and will soon be in operation in every state in the United States where flowers are grown, and, in fact, in all countries of the world.

"In order that its members living at a great distance from Rochester, which is at the present time the national headquarters, may have some further advantages the Society has what are termed Regional Vice Presidents, and one of these officers is sent to any large show being held in his vicinity, thereby making it a Regional A. G. S. Exhibition. The Society also supports these larger shows by offering its trophies, medals, etc., for prizes in the different classes, always favouring the amateur in this respect.

"There is also in preparation a work which will soon be completed and which will give the correct ratings of several thousand different Gladiolus. For many years Charles E. F. Gersdorff, of Washington, D. C., has been pursuing this work and has collected a vast fund of valuable knowledge relative to the classification of the different charac-

teristics of the Gladiolus. The Executive Committee has appointed Mr. Gersdorff a member of its Classification Committee and, therefore, the ratings that he is making will all be in accordance with the A. G. S. Standard, and the work that he has done in previous years will be checked up and corrected during the next blooming season so that all points will be correct. This work, when completed, will enable anyone to select the varieties of Gladiolus that have the highest ratings, irrespective of colour, as all colours will be included in this work."[2]

Several states have shown more or less activity in organizing their Gladiolus interests; sometimes under their state horticultural societies, sometimes independently. Ohio has had a Gladiolus society which is not active at the present time. Connecticut has recently organized one. Iowa has many enthusiastic growers, and their activities have shown in some of the great agricultural fairs of that state. In California the Gladiolus growers started an organization in March, 1925. Twenty-one men and women met in Los Angeles and formed the California Gladiolus Society, with constitution and by-laws modelled after those of the parent society, the A. G. S. With characteristic Western energy they promptly put on an exhibition and issued a yearbook containing mat-

ters of interest to the members, and telling of the aims of the Society. Other states are likewise organizing local Gladiolus societies.

The Canadian Gladiolus Society is doing fine work, having just completed a symposium, organized along somewhat different lines from that of the A. G. S. It is issuing Bulletins and going forward in a way that indicates the lively interest in this flower in the domain of "My Lady of the Snows." These bulletins are of real value. They treat of many subjects such as diseases of the Gladiolus, new varieties, the great activities in the growing of flowers throughout many parts of Canada, the design of standard score cards, and such subjects. *Bulletin II* gives a comprehensive record of a test of more than 500 varieties, giving many interesting facts in regard to the qualities of these varieties and the date of blooming. *Bulletin III* gives the results of an interesting variety symposium.

The New England Gladiolus Society was formed in 1919, and in the six years of its life has held six splendid exhibitions, sometimes at Mechanics Fair Building but usually in coöperation with and at the splendid exhibition halls of the Massachusetts Horticultural Society. The annual exhibitions of the New England Gladiolus Society have been noted not only for the quantity of blooms—usually

filling to capacity the great exhibition halls of the Massachusetts Horticultural Society—but also, and most especially, for the quality of the blooms.

The objects of the New England Gladiolus Society are similar to those of all other Gladiolus societies: to disseminate knowledge in regard to the Gladiolus, to make it more popular, and to interest the greatest number of amateurs in using this flower in their gardens and for decorations both in large buildings and in the home. Some of the most beautiful varieties have been originated in New England, and the New England Gladiolus Society together with the Massachusetts Horticultural Society has awarded many honourable mentions, awards of merit, gold, silver, and bronze medals, and various premiums for New England grown Glads and New England bred varieties as well as the most beautiful and finest varieties procurable from all parts of the world.

The Society has had many noted Gladiolus experts among its members, plans yearly programs, and holds four or five monthly meetings during the winter and spring months at which speakers discuss various subjects of interest to its members.

So from the small beginnings of 1910 there has been great progress throughout the North American continent. The American Gladiolus Society

is organized to-day to help stimulate interest in the Gladiolus throughout this country and in Canada, and in fact pretty much all over the civilized world.

The Gladiolus has now progressed so far in this country that instead of importing large quantities from Holland and other parts of the world, we are supplying our own needs not only with the old standard varieties but with many improved sorts that are even more beautiful in colour, form, and arrangement. Bulbs for breeding purposes and for introducing new and improved strains are still imported in small numbers from England, Holland, Germany, and Australia, but to-day we are likewise sending to them many new and beautiful varieties and types. It is generally recognized abroad that although the activity in the Gladiolus is far greater than it was one or two decades ago in England and in many other countries, it is small there compared to the great interest shown and the success of new creations in this country and in Canada. This interest is undoubtedly due in part to the stimulus of the activities of the American Gladiolus Society, and even more is an index of the rise of the Gladiolus in popular esteem. In response to this growing interest the American Gladiolus Society has appointed four regional

vice presidents to represent it in different parts of the country, so that regional organizations and regional shows may be developed under the supervision and guidance of the Society, and it is probable that in the near future Gladiolus exhibitions will be held in every state in the Union.

THE END

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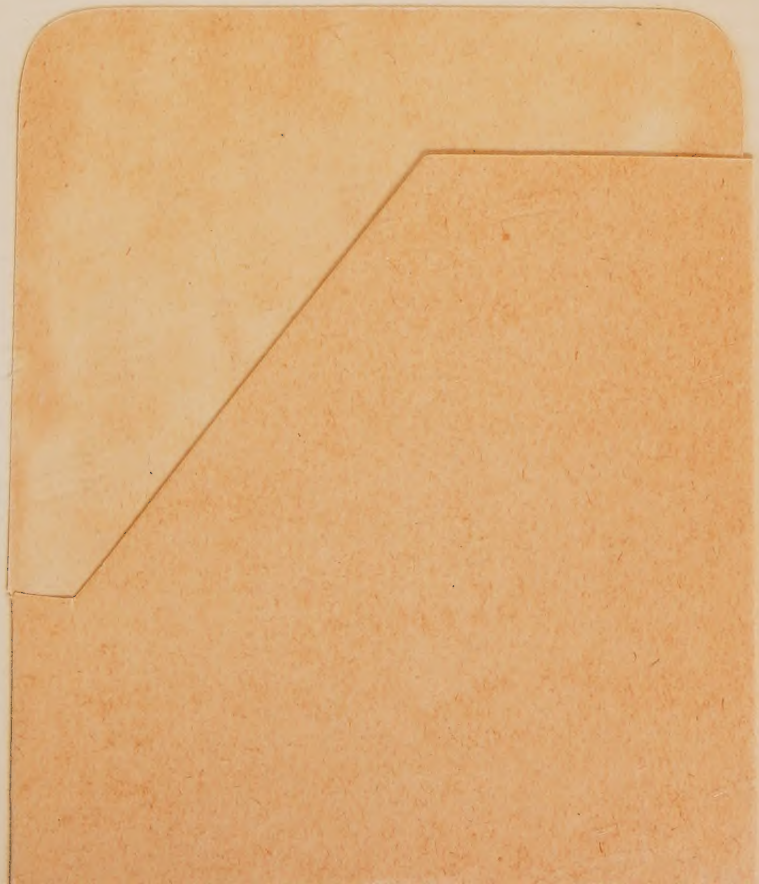

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